VERMONT COMPREHENSIVE ECONOMIC DEVELOPMENT STRATEGY

APPENDIX D

Target Sector & Cluster Analysis









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EXECUTIVE SUMMARY

Introduction

As part of the research for the Comprehensive Economic Development Strategy (CEDS), a targeted cluster and industry sector analysis was conducted to identify industries that offer a potential competitive opportunity for the State. Information gained from this research will be used to inform the planning process and will further refine strategic objectives and action in the Comprehensive Economic Development Strategy.

High performing, dense economic clusters are ideals that are often not achieved and when they are they are rarely subject to geopolitical boundaries such as states. They also are less typical in rural areas due to lack of density. Therefore rather than becoming hung up on whether something is truly a cluster, for this analysis we examine groupings of industry sectors and sub-sectors and based on employment size, growth, and concentration assess the extent to which there may be cluster characteristics in Vermont's economy and the opportunities among the sectors for growth. Industry sectors and subsectors in a state typically do not perform high on all these characteristics. Some exhibit high growth in employment but may be less concentrated than other sectors. These are typically potential "emerging clusters" which through continued growth will become more concentrated. In Vermont these "emerging clusters" include information technology, renewable energy, and aerospace. Others are highly concentrated but may not be currently growing. These typically are a state's "legacy" industries and through innovation or transformation may be able to increase future growth rates. In Vermont examples of these "legacy" clusters include wood products and agriculture.

The process of identifying targeted clusters can help organizations prioritize their efforts and limited funding on a particular cluster of industry sectors and sub-sectors. The analysis is not designed to encourage disinvestment in clusters or sectors that are not on this list, but is simply to identify what areas Vermont has a competitive advantage in and how can that be used to the State's benefit. What follows is a summary of the major findings of that research including top assets for the State.

Work Conducted

The Project Team identified nine clusters that were believed to have some potential for the State in terms of growing economic opportunities through job creation and wealth creation. These nine clusters can be seen in the table below. Please note that much more detail can be found in the full report including the list of all industry sectors that are included in the cluster. Also note that the clusters are not mutually exclusive in terms of the sectors they include. In other words, individual industry sectors can be included in multiple clusters. This reflects the fact that economic activity within industries is often related to other industries in terms of labor, supply chains, and markets. The Team pulled industry and employment data, occupation data, analyzed the location quotient, reviewed previous research on the clusters, and conducted additional market research to identify what opportunities exist for Vermont and how the State can best capitalize on a targeted cluster strategy.

Cluster Analysis Summary Table									
	2013	% of Total	2013	Average	2008-2013		2013-2023		
Cluster	Jobs	VT Employment	Establishments	Employees Per Establishment	# Change	% Change	# Change	% Change	
Business, Finance and Insurance	16,138	4.52%	1,779	9	621	4.00%	693	4.29%	
Energy	13,243	3.71%	1,337	10	614	4.86%	1,704	12.87%	
Food Production and Agribusiness	11,666	3.27%	587	20	1,594	15.83%	617	5.29%	
Forestry and Wood Products	10,265	2.87%	660	16	(2,455)	-23.92%	(619)	-7.93%	
Health Care and Life Sciences	53,562	15.00%	1,913	28	3,301	6.57%	11,862	22.15%	
Manufacturing and Aerospace	15,267	4.28%	270	57	(1,724)	-10.15%	(334)	-2.19%	
Tourism and Culture	33,594	9.41%	1,995	17	1,012	3.11%	1,408	4.19%	
Information Technology	6,362	1.78%	878	7	(389)	-5.76%	1,117	17.56%	
Professional and Technical Services	17,955	5.03%	3,030	6	279	1.58%	2,822	15.72%	

Major Findings, Assets, Challenges, and Recommendations

Themes that cut across multiple clusters:

- A focus on small, value added sectors and opportunities with unique assets to Vermont and a focus on quality. On average, businesses are small to medium in each cluster ranging from a low of six and seven employees per business establishment for the information technology and professional/technical services clusters to a high of 57 employees per establishment of food production and business establishment. This is consistent with the findings from the Economic Base Analysis conducted for this CEDS in which we found 89% of all business establishments in Vermont in 2012 consisted of less than ten employees¹.
- A need for workforce and job training
- Enhancing networks to connect industry with R&D, education, workforce, and financing entities

Recommendations:

- Include the targeted clusters within the State's business retention, expansion, and attraction strategies and programs. Specifically within the following:
 - o Renewable Energy and in particular solar, wind, and biomass
 - Value Added Food Production and Farm to Plate
 - Value Added, High Quality Wood Products
 - Health Services including health care services, tele-medicine, pharmaceutical preparation manufacturing, and medicinal and botanical manufacturing.
 - Information Technology
 - o Aerospace and Aviation Manufacturing
 - Environmental Consulting Services
 - Captive Insurance
 - o Tourism with a focus on outdoor recreation, arts, culture, and food/agriculture
- Develop workforce development initiatives and projects to support the growth of each of the targeted clusters.
- Develop initiatives and projects to provide access to funding to support innovation, research and development, and entrepreneurship innovation in each of the targeted clusters.

The following is a summary of assets and challenges for each Targeted Cluster area.

¹ www.youreconomy.org

Renewable Energy Cluster

Assets

- Strong branding potential to build on with the perception of Vermont and its reputation for high-quality, natural resource-friendly products
- Vermont is attractive to green entrepreneurs because of the environment and lifestyle
- Strong fit with Vermont's strength in growing independent "grow your own" businesses as well as culture of self-reliance.
- Strong concentration of Environmental Consulting Services- Vermont Environmental Consortium and numerous environmental consulting and engineering firms in the State to support the growth of the clean-energy industry
- Historic and projected growth for cluster as a whole
- Higher than average wages
- Recent successes in securing venture capital for green energy
- Market research points to national growth in Environmental Consulting Services and Scientific
 and Economic Consulting, both which have relative low barriers to entry and potentially high
 industry profit margins
- Research and innovation within the bio-fuel industry and access to natural resources to support the industry
- Clean Energy Development Fund exists to support the Energy Cluster and alternative sources
- Continued increase in environmental regulations anticipated nationally and globally, which will increase demand for services
- Potential to grow the alternative energy aspect of the Energy Cluster as the State intends to grow the use of renewable energy setting a goal of 90% of the state's energy coming from renewable sources by 2050.
- Clean Energy Development Fund is working to define and quantify the state's current clean energy industry in a way that will allow the industry to be tracked and monitored for performance.
- The Department of Public Service completed a Comprehensive Energy Plan in 2011 to address Vermont's energy future and make recommendations on how the state should move forward to become a leader in sustainable and affordable energy.
- Renewable Energy Vermont is a trade association committed to reducing the state's reliance on fossil fuels and expanding the availability of renewable energy in Vermont. The organization offers technical assistance, holds conferences, publishes newsletters, and provides consumers with Vermont specific information related to available incentives.
- Energy Action Network is an organization that focuses on ending Vermont's reliance on fossil fuels and helping the State meet their goal of 90% renewable energy by 2050. The organization's work is based on directing capital to the renewable energy sector, engaging the public, technology innovation, and regulatory reform.
- Vermont Environmental Consortium provides support for the environmental business sector through advocacy, networking, planning and initiating projects, and creating links to promote research, education, training, and job creation.

- The Renewable Energy Resource Center provides technical support to consumers interested in renewable energy including providing information on incentive programs, economic and environmental benefits, and how to select the right energy system.
- The Renewable Energy Atlas of Vermont offers users the ability to map the various energy options at their location including potential for wind, biomass, geothermal, hydro, and solar.²
- Solar: Solar photovoltaic (PV) and hot water are the fastest growing forms of renewable energy in Vermont. Additionally, a report released in 2014 identified Vermont as the nation's largest per capital gains in solar-related jobs. Incentives exist in the state to encourage the development of small and large scale solar projects including a net metering performance-based incentive, small-scale renewable energy incentive, funds through the Clean Energy Development Fund, and Green Mountain Power also offers customers a performance-based credit. Installation costs for solar projects have decreased by 50% since 2010 which has created increase demand for it compared to other sources of electricity and has led to the solar industry job growth.
- Wind: Approximately 1.2% of the electric power in Vermont is currently sourced from wind energy. The mountainous topography of Vermont makes it ideal for wind development projects as the best location to site projects are typically found at higher elevations with strong, consistent wind. There have been a number of community wind projects developed including the Searsburg Wind Power facility in southern Vermont and the Harrison Family's Georgia Mountain Project. The Department of Public Services Energy Plan suggest that there are 20,000 acres in the state that would be suitable for wind energy development projects.³ Financial incentives exist for wind projects including the Vermont Small Wind Incentive Program and the Vermont Anemometer Loan Program that provides wind measurement tools to Vermont residents considering a small wind system.
- Biomass: The Comprehensive Energy Plan states that 6% of Vermont's electricity and 14% of the state's heating needs come from biomass fuels. Numerous facilities around the state have started to implement biomass for heating, including the Hartford High School in White River Junction and a major project in Montpelier to provide wood chip-generated heat to downtown buildings. Currently only 4% of the Northeast gets its heat from wood, but increasing the number of people and organizations utilizing biomass for energy will keep more dollars in the local economy and reduce the importing of natural gas and other fossil fuels. The Biomass Energy Resource Center (BERC) reports that heating with wood in the Northeast allows \$0.80 of every dollar spent to stay in the region. Beyond just wood chips, the Vermont Grass Energy Partnership is working to determine the feasibility for grass energy in Vermont and working to identify and respond to challenges in the bioenergy supply chain. Grass energy would allow Vermonters to use a multitude of natural resources that are readily available in the states many pastures and working landscapes.

Smart Meters - Vermont utilities have begun to install new digital meters or "smart meters" due to an ARRA grant from the federal government. The Smart Meters are expected to help customers better understand and reduce their energy usage and improve responsiveness of the utility companies to outages⁵. The increased utilization of a smart grid and smart metering will

²http://www.vtenergyatlas.org/

³http://publicservice.vermont.gov/sites/psd/files/Pubs_Plans_Reports/State_Plans/Comp_Energy_Plan/2011/201 1%20CEP_Volume%202%5B1%5D.pdf

⁴http://www.marketplace.org/topics/economy/new-england-cranks-its-wood-burning-stoves

⁵http://publicservice.vermont.gov/sites/psd/files/Pubs_Plans_Reports/State_Plans/Comp_Energy_Plan/2011/201 1%20CEP_Volume%202%5B1%5D.pdf)

have an impact on the IT cluster in the State as there will be demand for companies with the skills to manage, upgrade, and improve the system.

Challenges

- Disconnect between skills of Vermont college graduates and the needs of companies, future occupation demand exists for middle skill (more than high school but less than bachelor's) and for occupations requiring bachelor's and beyond
- Closure of Vermont Yankee and impact on workforce and energy production
- Lack of R&D funding/performance and support for innovation and commercialization
- Upgrades to the distribution systems will need to be made to handle increased demand by large utility-scale renewable energy projects⁶
- Solar: Commercial facilities that want to install PV systems are limiting themselves to less than 150kW to avoid the more lengthy and complex permitting process for systems over that threshold
- Wind: One challenge of the wind industry is identifying sites where the turbines will not interfere with the traditional views and landscapes that are expected in Vermont. Additionally, the high permitting and construction costs which have an impact on the electricity costs of wind power
- Biomass: The siting of a power plant-sized facility is one of the largest challenges for the biomass industry since people do not want these large facilities close to population centers but that is where they would be most effective
- Smart Metering: There is some controversy surrounding smart metering in Vermont as some residents are concerned about the adverse health effects of microwave radiation and potential invasion of privacy. A group of individuals are petitioning Governor Shumlin to place a statewide moratorium on the deployment of the smart meter technology to allow for further research and discussion⁷. Residents are able to opt-out of the smart meter if they would prefer and studies have determined that smart meters present no health hazard and they comply with the limits set by the FCC by a wide margin⁸.

Food Production and Value Added Processing Cluster

Assets

- Good fit for Vermont in terms of brand, values, image and overall historic workforce and networks. Strong fit with Vermont's strength in growing independent "grow your own" businesses as well as culture of self-reliance.
- Good fit for Vermont in terms of brand, values, image and overall historic workforce and networks.

http://publicservice.vermont.gov/sites/psd/files/Pubs Plans Reports/State Plans/Comp Energy Plan/2011/2011 %20CEP Volume%202%5B1%5D.pdf

⁷ www.stopsmeters.org

⁸http://publicservice.vermont.gov/sites/psd/files/Topics/Electric/Smart Grid/Vermont%20DPS%20Smart%20Mete r%20Measurement%20Report%20-%20Final.pdf)

- Organization support for the industry through the Farm to Plate Network and Vermont Food System Atlas.
- An increase in demand for organic, healthy, and locally produced goods has supported the
 growth of niche food producers throughout Vermont. The market has supported increasing
 opportunities for producers and entrepreneurs throughout the state and has led to sustainable
 smaller companies as well as large well known, national brands.
- The evidence exists to suggest that small, "mom and pop" type of specialty manufacturing companies are attracted to Vermont and New Hampshire due to the historic focus on agriculture.
- Literature research and data point to the fact that the greenhouse industry (as a subsector of agriculture) could be a potential target for the State.
- "Made in Vermont" brand is recognizable and, if enhanced and promoted regionally, could lead to increased pricing power and hence profit margins for producers throughout the State.
- Good access to raw materials for a variety of food production and value added processing.
- Existing "Farm to Plate Strategic Plan" that provides detailed assessment and strategies for the State.
- Historic and projected growth in the cluster particularly in beverages such as Coffee and Tea Manufacturing, Breweries, and Wineries. We recognize that growth in the Coffee and Tea Manufacturing industry is likely driven by Green Mountain Coffee Roasters.
- Continued support of food production entrepreneurs throughout the state through incubators, test kitchens, and co-op facilities.
- Vermont's maple syrup production is the largest in the United States and is a very fast growing sector.
- Internationally known producer of artisanal cheeses and unique training programs including through Jasper Hill.
- The Vermont Higher Education Food System Consortium will grow capacity for Vermont to be a world class destination for food and food system management.
- Vermont slaughterhouses practice humane handling which is unique and appreciated by certain consumers.

Challenges

- Cost barrier of locally produced, small-scale production. This can be a disadvantage for consumers, making it difficult for producers to compete.
- Climate change and extreme weather can severely impact annual crop production.
- Increasing centralization of the food industry under major umbrellas make it difficult for small operations to compete.
- Concentration of industry growth and employment in a few specific companies on the food manufacturing side and concentration of dairy acreage on the agriculture side. This tends to skew the data and overstate opportunities in cluster.

http://www.nass.usda.gov/Statistics_by_State/New_England_includes/Publications/0605mpl.pdf
Target Sector & Cluster Analysis – Appendix D

• Low wages and seasonal work associated with this industry can make it unattractive to workers, putting a strain on organizations looking to fill positions.

Forestry and Wood Products Cluster

Assets

- Increased demand for environmental friendly, "green" wood products for children's toys.
- State's reputation for high quality goods and craftsmanship enabling higher prices on goods.
- Access to 4.46 million acres of forested land, including 4.35 million acres classified by USDA
 Forest Service as timberland or land that is fertile and accessible enough to produce wood as a
 crop.
- As the residential housing construction market strengthens following the Great Recession there will be increased demand for household furniture and construction products and materials.
- Vermont's forests contribute significant revenue to the State's economy through manufacturing and forest-related recreation and tourism.
- High concentrations in Non-upholstered Wood Household Furniture Manufacturing, Hardwood Veneer and Plywood Manufacturing, and All Other Miscellaneous Wood Product Manufacturing
- Vermont Wood Marketing Council is tasked with promoting the brand of Vermont wood products and promoting the high quality goods. A plan is in place to do this work and to create a business friendly environment for the wood products sector.
- State support for investing in the forestry sector through the Working Lands Enterprise Fund and the expansion of technical assistance programs to include the forest product sectors. Technical assistance programs include the Vermont Agricultural Development Program and Farm Viability Program.

Challenges

- Lack of workforce with necessary skillset.
- Overall declining industry with decreasing employment and low wages.
- Competition from other less expensive products such as plastics and rubbers will make it difficult for wood products to regain employment lost.
- The Non-upholstered Wood Household Furniture manufacturing industry has a very strong location quotient (over 10) compared to the national average but it is projected to lose employment, suggesting a decline in a very important industry.
- The growing prominence of import penetration, specifically from emerging economies (e.g. China), has further hampered the industry's growth prospects. These countries' low labor and overhead costs allow them to offer lower prices on comparable products, effectively eroding domestic demand for U.S.-made products.
- Lack of innovation, not investing in new equipment or employees, high energy costs, high insurance costs, and retention and recruitment of employees¹⁰

¹⁰ Economic Importance and Wood Flows from Vermont's Forests, http://www.vtfpr.org/includes/documents/ecimportfor.pdf Target Sector & Cluster Analysis – Appendix D

Health Care and Life Sciences Cluster

Assets

- The health services component of this cluster is large in terms of employment, has grown
 historically and is projected to continue to grow. Even though this industry segment primarily
 serves the resident population and is not heavily export based, it is an important segment to
 Vermont because of the job opportunities. The industry is seeing both consolidation in terms of
 health systems and facilities but also growth of niche businesses.
- Pharmaceutical Preparation Manufacturing and Medicinal and Botanical Manufacturing are two
 industries that have grown over the last 5 years and are projected to continue to grow through
 2023. These industries offer an opportunity for the State in terms of supporting business
 attraction and retention. Vitamin and supplement manufacturing would build on the healthy
 living and whole food brand of Vermont while supporting well-paying manufacturing jobs.
- Aging population will require increasing amount of health care services required.
- Tele-medicine represents opportunity for growth with cross-section of IT and health services.
 Tele-medicine can increase access, improve care, and reduce costs and is an efficient way to provide high quality service to rural parts of the state.

Challenges

- Historic and projected employment increases will challenge the workforce system to provide quality workforce. Demand for skilled employees will continue to increase and educational systems should be prepared to meet that demand.
- Access to care/facilities in some rural areas presents challenge/unmet needs
- Health Care and Life Sciences is an important cluster for any state as it is a major employer and source of high paying jobs. However, unless there is a significant shift in the type and amount of R&D being performed it is unlikely that Vermont will be able to compete with other areas in Life Sciences fields.
- Low wages for large percentage of employees in the industry

Information Technology Cluster

Assets:

- Overall good fit with Vermont in terms of supporting small independent businesses, entrepreneurs, contractors, and consultants
- Low barriers to entry low capital requirements
- Can be influenced by quality of place but also requires access to broadband and other talent (for networks)
- Vermont's strengths based on employment in Custom Computer Programming Services and Computer Systems Design Services
- Vermont's occupation strengths are based on current size and projected growth, include Computer User Support Specialists, Software Developers (Applications), Network and Computer Systems Administrators, Software Developers (Systems Software), Telecommunications Line Installers and Repairers, and Computer Systems Analysts

- Higher than average wages with higher education degrees (associate's and beyond) typically required
- Continued growth nationally and globally projected in IT markets The IT consulting industry is expected to grow further by 1.2% to reach \$337.0 billion in 2013 and global and national growth projected in IT Security, Software and Application Development, Enterprise Software, and Cloud Computing
- IT intersects with other sectors including telehealth, health records, and business analysts
- Recent success in accessing venture capital media, electronic, internet, and ecommerce companies in Vermont received 19.3 million in venture capital between 2005 and 2012¹¹
- Significant improvement in the availability and quality of broadband throughout the state through ConnectVT, thus making IT businesses, contractors, and entrepreneurs more likely to start and expand
- The State has a program to provide direct incentives for students in STEM to locate and remain in Vermont
- Vermont Center for Emerging Technologies (VCET) provides support (start-up, incubation acceleration) specifically for the software and information technology industry; however the program is relatively small and concentrated in Chittenden County (there is need for expansion of funding and services)
- IT and high tech goods and services are export oriented (i.e. bring new wealth into the state)
- Several recent (2009 and beyond) initiatives have assessed information technology and economic development related issues and have developed detailed goals, findings, and recommendations. These include ConnectVT, Vermont's Commission on the Future of Economic Development, a 2012-2013 Legislative Committee on Enhancing Vermont's Software and Information Technology and a 2102 industry initiative lead by the Vermont Technology Alliance, Vermont Technology Council, and Vermont Bioscience Alliance. As a whole, these initiatives provide excellent guidance for a focus on IT Cluster strategies and, in particular, the Legislative Committee on Enhancing Vermont's Software and Information Technology provides specific recommendations for the State, providing a solid action agenda for growing the cluster.

Challenges:

- Most occupations require at least an associate's degree, many require bachelor's and beyond
- Finding qualified workforce
- Many programs require additional state funding priorities for this cluster must compete with those in other clusters and with other state programs and services
- More opportunities needed for preparing K-12 students with critical skills needed for college level study and career preparation in the fields of computer science and hardware/software engineering
- A Made in Vermont brand of quality in rural agricultural and recreation has not translated to quality and opportunities in tech sectors

¹¹ Ibid

Manufacturing and Aerospace Cluster

Assets

- The Vermont Aerospace and Aviation Association has been working to develop the State's aerospace economy through efforts in network development and business attraction and retention.
- Manufacturing provides the State will steady jobs that pay good wages. Nationally,
 manufacturing is making resurgence through more highly-skilled niche manufacturing
 operations that require a technically savvy workforce. This growth is occurring in small to
 medium-sized companies that develop a niche in national and regional global supply chains.
 Those companies that are succeeding are value-add with a focus on quality. These
 characteristics are a good fit for Vermont which has had success in small-to medium-sized
 businesses with a focus on a quality brand.
- The "Semiconductor and Circuit Manufacturing" industry has a high location quotient that is related to the IBM operations in Chittenden County. This industry is strong in Vermont so opportunities do exist, especially as more consumer products require higher and higher levels of technology, such as smartphones and personal vehicles.
- Higher than average wages.
- Nationally, growth in re-shoring and on-shoring increasing activity in U.S. This is being driven by reduction in energy costs in the US, focus on quality, proximity to North American consumer wholesale and markets, a reduction in the value of the US dollar, and a focus on overall, finalcost to market.
- Detailed strategies development by Vermont Advanced Manufacturing Partnership to support and grow manufacturing provide roadmap for the State.

Challenges

- Increased competition from global producers will make it difficult for Semiconductor and Circuit
 Manufacturing in the United States. The price of these products is expected to weaken, likely
 causing a reduction in the number of industry operators. A concentration of a few large
 businesses in this sector in Vermont puts the state at risk.
- Manufacturing companies that rely on research and development, such as Medical Device
 Manufacturing, prefer to locate near major metropolitan areas (access to workforce,
 infrastructure, investors and other support services) which may make it difficult for Vermont to
 compete. A reliance on access and proximity to major research and development centers as well
 as hospitals and institutions puts the State at a significant disadvantage.
- Manufacturing companies are increasingly relying on R&D. The lack of funding for innovation and commercialization in Vermont may make it difficult to attraction manufacturing firms.
- Historic job losses have led to perception that industry offers few future employment opportunities, yet lack of skilled workers persist.

Professional and Technical Services Cluster

Assets

 Many of the industries in this cluster are associated with small, flexible firms that are able to respond to changing business climates.

- Companies often are able to contract for work out of the State so are able to export their services and bring wealth into the State.
- Some occupations and industries in this cluster can be performed remotely (graphic design services, marketing and research polling, payroll services, engineering services, computer programming services), allowing employees to work for larger firms located elsewhere. The ability to work remotely makes it possible for employees to live where they want without concern for local job market. Vermont's location in the northeast makes it possible for residents to work from home and have the quality of life they desire while still being able to access major markets and work for larger firms.
- Telecommuting and remote work makes it possible for Vermont residents to earn a higher income than otherwise may be possible within the local economy, allowing them to stay in Vermont and invest in the community.
- High income and education levels are associated with this cluster. Growing this cluster would make it possible to attract young professionals to the State.
- The Engineering Services industry is expected to grow as construction rises and demand from
 downstream markets bounces back from the Great Recession. Profit margins should also benefit
 from the rising use of computer-aided design systems that provide cost-effective project
 assessment. This technology will increasingly be used at construction sites via tablet devices,
 improving communication and reducing costs associated with on-site errors.
- The Environmental Consulting Services industry has a high location quotient (2.44) and historic
 and projected growth. This industry fits in with the overall Vermont image and could be a good
 opportunity for the State.
- The Graphic Design Services industry also has a high location quotient (2.15) and might be a good fit for the State in terms of attracting creative professionals who are interested in the arts, cultural, and community offerings of the State.

Challenges

- Unreliable cell service and broadband access in parts of the state can make it difficult for telecommuting and working remotely. Remote workers must be confident that they will be able to do their work and connect with clients and coworkers with ease. Recent improvements in broadband through Connect VT are addressing this challenge.
- For growth within companies to occur, workforce development is needed to help fill technical positions that demand higher educational attainment.

Access to major airport and passenger rail is a constraint in part of the state.

Tourism and Culture Cluster

Assets

- Increased use of natural resources for hiking, camping, adventure trips, and other types of recreation that is minimally disruptive to the natural environment
- Decreased distance and length of vacations people are taking will make Vermont a more likely destination for those coming from within a few hours and looking for a close weekend-trip destination

- Increased interest in adventure races and other recreation events could draw people to Vermont throughout the year
- Outdoor recreation and arts fit well with overall Made in Vermont brand and image
- Historically strong growth in the hospitality industries (hotels, restaurants, etc.) with growth expected to continue
- Potential to grow the recognition for non-winter tourism in Vermont including kayaking, fishing, hunting, mountain biking, etc.
- Many recreational assets available in Vermont are considered to be "gateway activities", which
 are those activities that are affordable and accessible and tend to lead to participation in other
 outdoor recreation such as hiking, camping (car, backyard, RV), bicycling, fishing, trail running,
 etc.
- 49% of New Englanders over the age of 6 participate in outdoor activities
- Food related tourism can benefit both food/agriculture and tourism industry, Vermont has a high quality reputation in both
- Tourism services, amenities, and facilities benefit out of state tourists as well as residents

Challenges

- Climate change and extreme weather impacting tourism facilities and consumer preferences
- Change in consumer preferences away from golfing and skiing towards less cost prohibitive activities
- 37% of Americans over the age of 6 do not participate in outdoor activities due to a lack of
 interest. Even more concerning is the lack of interest in youth, 45% of youth ages 13 to 17 do
 not participate in outdoor activities because of a lack of interest
- Low wages, seasonality, and high turnover of occupations in this cluster

Business, Finance, and Insurance Cluster

Assets

- Reputation as a competitive location for captive insurance industry.
- Ability to work with captive insurance industry to provide a business friendly climate that is able to change with the industry over time.
- Premium tax credit for new captive companies and other incentives for captives to locate in Vermont. Ongoing attraction and retention efforts geared towards developing the captive insurance industry in Vermont.
- There has been growth in the Corporate, Subsidiary, and Regional Managing Offices industry. This industry is comprised of establishments (except government establishments) primarily engaged in administering, overseeing, and managing other establishments of the company or enterprise. These establishments normally undertake the strategic or organizational planning and decision making role of the company or enterprise. Establishments in this industry may hold the securities of the company or enterprise. While there has been growth in this industry, the

location quotient is .38, indicating that this industry is not concentrated in Vermont as compared to the national average.

Challenges

- No real competitive advantage in the cluster other than in captive insurance. The location
 quotient analysis did not identify any industries with extremely high concentrations of
 employment.
- Increasing use of online banking and decreased demand for in-person operations may lead to a decrease in employment.

Private Education

Assets

- Historic and projected growth
- Fits well with Vermont's focus on quality and niche markets
- Higher than average employees per establishment
- Brings new people into the state

Challenges

- Lower than average wages for many occupations
- Retention of students beyond graduation

INTRODUCTION

As part of the research for the Comprehensive Economic Development Strategy (CEDS), a targeted cluster and industry sector analysis was conducted to identify industries that offer a competitive opportunity for the State of Vermont. Information gained from this research will be used to inform the planning process and will further refine strategies, initiatives, and projects in the economic development plan.

Michael Porter of the Harvard Business School defines industry clusters as:

"Clusters are geographic concentrations of interconnected companies, specialized suppliers, service providers, and associated institutions in a particular field that are present in a nation or region. Clusters arise because they increase the productivity with which companies can compete." ¹²

The support and growth of clusters is an important role for governments and economic development professionals because clusters build on existing strengths and grow the global competitive advantage of a community, region, or state to attract additional investment.

High performing, dense economic clusters are ideals that are often not achieved and when they are they are rarely subject to geopolitical boundaries such as states. They also are less typical in rural areas due to lack of density. Therefore rather than becoming hung up on whether something is truly a cluster, for this analysis we examine groupings of industry sectors and sub-sectors and based on employment size, growth, and concentration assess the extent to which there may be cluster characteristics in Vermont's economy and the opportunities among the sectors for growth. Industry sectors and subsectors in a state typically do not perform high on all these characteristics. Some exhibit high growth in employment but may be less concentrated than other sectors. These are typically potential "emerging clusters" which through continued growth will become more concentrated. In Vermont these "emerging clusters" include information technology, renewable energy, and aerospace. Others are highly concentrated but may not be currently growing. These typically are a state's "legacy" industries and through innovation or transformation may be able to increase future growth rates. In Vermont examples of these "legacy" clusters include wood products and agriculture.

Identifying Targeted Clusters

As the first step in the analysis, the Project Team reviewed the information contained in the Economic Base Analysis conducted for the CEDS to identify clusters that might offer opportunities for the State. These initial clusters were reviewed and discussed with the CEDS Committee for input for further consideration.

Then, the Project Team conducted additional assessment of the initial clusters and industries to further narrow down the clusters for more detailed, focused analysis. This selection was based on industry performance within the clusters in terms of:

- Size of the industry employment relative to all industries
- Historical employment growth
- Projected employment growth
- Concentration (as measured by location quotient)
- Competiveness (as measured by shift-share analysis)

¹² Harvard Business School – Institute for Strategy and Competitiveness. www.isc.hbs.edu/econ-clusters.htm Target Sector & Cluster Analysis – Appendix D

From that review, nine clusters were selected for further research. The clusters assessed in detail, referred to as the "targeted clusters," include: 13

- Business, Finance and Insurance
- Energy
- Food Production and Value Added Processing
- Forestry and Wood Products
- Health Care and Life Sciences
- Manufacturing and Aerospace
- Tourism and Culture
- Information Technology
- Professional and Technical Services

For each of the nine clusters, additional market research was conducted to provide a deeper understanding of opportunities. This resulting report includes: a definition of the selected clusters including all North American Industrial Classification System ("NAICS") codes included at the 6-digit level, historic and projected employment, national location quotient, information about the 20 largest occupations within the cluster, and findings from the market research.

Assessing the Targeted Clusters

Once the targeted clusters were identified, the Project Team worked to define each cluster by selecting specific industries - using six-digit NAICS codes – that when grouped together represent each targeted cluster. Clusters can be defined in a variety of ways, so the Project Team drew on information gathered from the review of preview documents, past experience working in Vermont, the Economic Base Analysis report completed for this project, standard definitions, and discussions at the Regional Meetings to determine which NAICS codes to include in each of the nine clusters.

Once the clusters and their NAICS codes were defined, the Project Team conducted data collection and analysis. This involved gathering industry and occupation data and looking at trends from 2008 to 2013 and projections through 2023. This information allowed the Project Team to better understand employment and occupation trends within each of the clusters as well as look at where opportunities may lie in the future. The data analysis includes location quotients, growth projections, and an assessment of the overall size and nature of the occupations in each cluster. Additionally we look at the size of establishments as way to better understand the types of companies that make up the individual clusters. This information provided for a comprehensive understanding of the existing conditions in the State of Vermont and what is likely to happen in the future that would impact the economy.

In addition to industry and occupation data, the Project Team gathered information on innovation indicators. Innovation indicators include data on venture capital investments in the state, numbers of patents being issued and in what areas, and federal government investments. All of this helped to better understand what areas of the economy are poised for innovation and what areas are not receiving the support necessary to be innovative. Note that this material is in the Competiveness Analysis research but was referred to for this Cluster Analysis.

Finally, the Project Team conducted market research on each of the targeted clusters to better understand what is occurring nationally for these clusters and specific industries within the clusters. This

¹³ Additional research was also conducted on the Private Education Cluster

¹⁴ Annual wages are provided based on median hourly wages multiplied by 2,000 annual hours worked.

¹⁵ The average establishment size information may be skewed as a result of a few very large companies within a cluster but it can still be useful background information for the analysts.

provided information on what site selectors are looking for, what trends professionals are seeing within the clusters, and how Vermont can capitalize further on these clusters.

Presentation of the Data

Most of the data presented in this report are broken down first into the Targeted Clusters and then further into the industry sectors that make up the clusters, organized using the North American Industrial Classification System ("NAICS"). Occupational data is reported based on the federal system of classifications referred to as the Standard Occupational Classification ("SOC"). NAICS and SOC codes are classification codes that are used nationally to group industries and occupations into similar categories from low to high levels of specificity. All date on wages by SOC code represent annual "median" wages.

Data Sources

Cluster establishment, employment, and occupation data used in this analysis is provided by <u>Economic Modeling Specialists</u>, Intl. ("EMSI"). EMSI combines employment data from the Quarterly Census of Employment and Wages ("QCEW") produced by the Department of Labor with data from the Regional Economic Information System ("REIS") published by the Bureau of Economic Analysis ("BEA") and augmented with County Business Patterns ("CBP") and Nonemployer Statistics ("NES") published by the U.S. Census Bureau.

Projections are made by EMSI and are essentially informed, statistical guesses based on the latest available EMSI industry data combined with past trends in each industry, national growth rates of industries, and data from the Bureau of Labor Statistics. EMSI creates long-term, 10-year industry projections starting from the current year; the year 2013 for this particular report. Note that projections are not "predictions" and projected job growth, for example, is not the same thing as "demand".

The data used is EMSI's "complete employment" data set, which includes both covered and uncovered jobs. ¹⁶ In other words, it includes both traditional employment and non-traditional employment such as the self-employed (self-employed includes sole proprietorships and partnerships). As traditional jobs have been replaced or augmented by freelance work, consulting, and self-employment, these non-covered jobs have become much more important to the economy and EMSI provides researchers with a way to track the trends over time.

Market research was conducted using a variety of sources including previous reports and documents, industry and economic development research from the Web, and for select industries IBISWorld, a powerful business tool that provide strategic insight and analysis on more than 1,000 U.S. industries. Note that the information in the market research section must continue to rely on projections for 2013 because all information about revenues are not yet reported therefore some of the wording may reflect estimates or projections through 2013. Information for the examples of companies in the various clusters is pulled from Business Analysis Online by ESRI, a service that maintains listings of businesses by their NAICS code. Sources are cited as used.

Target Sector & Cluster Analysis – Appendix D

¹⁶ Jobs <u>covered</u> by unemployment insurance are tracked by the Bureau of Labor Statistics' Quarterly Census of Employment and Wages. EMSI's <u>complete</u> employment category uses Bureau of Economic Analysis data (<u>www.bea.gov/bea/regional/</u>) as its primary benchmark. In addition to covered jobs taken care of by QCEW data, BEA data attempt to count all types of paid employment.

CLUSTER ANALYSIS

Renewable Energy

Cluster Description

The Renewable Energy Cluster ("Energy Cluster") for Vermont is made up of a combination of manufacturing, generation, distribution, and technical services. The largest industry within the Energy Cluster is Plumbing, Heating, and Air Conditioning Contractors followed by Electrical Contractors and Other Wiring Installation Contractors. One of the reasons that the Energy Cluster was chosen for Vermont was the potential for Vermont to be a leader in green and alternative energy generation and product manufacturing. Building an image of Vermont as a leader in green technology would further the brand and values of the state and would fit in nicely with some of the advanced product manufacturing currently occurring in Vermont. Furthermore, there is potential for research to be conducted at colleges and universities in the state with the ability to lead to commercialization. Within the larger cluster, specific focus was paid to solar, wind, and biomass subsectors as potential opportunities for the State.

Vermont has a growing number of renewable energy companies supported by trade associations and networks like Renewable Energy Vermont and the Energy Action Network that provide assistance and advocacy for the renewable energy industry in Vermont. Additionally technical and financial assistance programs like Vermont's Sustainably Priced Energy Development (SPEED) Program which was developed to make long term contracts at fixed prices available to renewable energy facilities that qualify make renewable projects financially attractive to investors.

The Department of Public Services prepared a Comprehensive Energy Plan in 2011 that outlined current conditions and recommendations for the future. This review of the Renewable Energy Cluster is not intended to replace or restate that work that was done but instead it is intended to build off of it.

One constraint that may make it difficult for the Energy Cluster to succeed in Vermont is the level of research and development ("R&D") funding for some of the innovation indicators. Without significant funding for research and development, it will be difficult for Vermont to compete in a cluster that is changing on a regular basis and must keep up with all of the most recent innovations.

The following table contains a list of the industries included in this analysis of the Energy Cluster. Note that the reason the cluster definition includes some industries associated with fossil fuels and natural gas because renewable energy sources require similar infrastructure, technical skills, support industries, supply chains, workforce, and distribution systems.

	Energy Cluster						
NAICS Code	Description						
221111	Hydroelectric Power Generation						
221112	Fossil Fuel Electric Power Generation						
221113	Nuclear Electric Power Generation						
221119	Other Electric Power Generation						
221121	Electric Bulk Power Transmission and Control						
221122	Electric Power Distribution						
221210	Natural Gas Distribution						
221330	Steam and Air-Conditioning Supply						
237110	Water and Sewer Line and Related Structures Construction						
237120	Oil and Gas Pipeline and Related Structures Construction						
237130	Power and Communication Line and Related Structures Construction						
237990	Other Heavy and Civil Engineering Construction						
238210	Electrical Contractors and Other Wiring Installation Contractors						

238220	Plumbing, Heating, and Air-Conditioning Contractors
332410	Power Boiler and Heat Exchanger Manufacturing
333414	Heating Equipment (except Warm Air Furnaces) Manufacturing
333611	Turbine and Turbine Generator Set Units Manufacturing
334519	Other Measuring and Controlling Device Manufacturing
335311	Power, Distribution, and Specialty Transformer Manufacturing
335312	Motor and Generator Manufacturing
335313	Switchgear and Switchboard Apparatus Manufacturing
335314	Relay and Industrial Control Manufacturing
335911	Storage Battery Manufacturing
335912	Primary Battery Manufacturing
335929	Other Communication and Energy Wire Manufacturing
335931	Current-Carrying Wiring Device Manufacturing
335991	Carbon and Graphite Product Manufacturing
335999	All Other Miscellaneous Electrical Equipment and Component Manufacturing
423610	Electrical Apparatus and Equipment, Wiring Supplies, and Related Equipment Merchant Wholesalers
423690	Other Electronic Parts and Equipment Merchant Wholesalers
423720	Plumbing and Heating Equipment and Supplies (Hydronics) Merchant Wholesalers
541330	Engineering Services
541360	Geophysical Surveying and Mapping Services
541380	Testing Laboratories
541620	Environmental Consulting Services
541690	Other Scientific and Technical Consulting Services
541712	Research and Development in the Physical, Engineering, and Life Sciences (except Biotechnology)

Summary and Conclusions

Assets

- Strong branding potential to build on with the perception of Vermont and its reputation for high-quality, natural resource-friendly products
- Vermont is attractive to green entrepreneurs because of the environment and lifestyle
- Strong fit with Vermont's strength in growing independent "grow your own" businesses as well as culture of self-reliance.
- Strong concentration of Environmental Consulting Services- Vermont Environmental Consortium and numerous environmental consulting and engineering firms in the State to support the growth of the clean-energy industry
- Historic and projected growth for cluster as a whole
- Higher than average wages
- Recent successes in securing venture capital for green energy
- Market research points to national growth in Environmental Consulting Services and Scientific
 and Economic Consulting, both which have relative low barriers to entry and potentially high
 industry profit margins
- Research and innovation within the bio-fuel industry and access to natural resources to support the industry

- Clean Energy Development Fund exists to support the Energy Cluster and alternative sources
- Continued increase in environmental regulations anticipated nationally and globally, which will increase demand for services
- Potential to grow the alternative energy aspect of the Energy Cluster as the State intends to grow the use of renewable energy setting a goal of 90% of the state's energy coming from renewable sources by 2050.
- Clean Energy Development Fund is working to define and quantify the state's current clean energy industry in a way that will allow the industry to be tracked and monitored for performance.
- The Department of Public Service completed a Comprehensive Energy Plan in 2011 to address Vermont's energy future and make recommendations on how the state should move forward to become a leader in sustainable and affordable energy.
- Renewable Energy Vermont is a trade association committed to reducing the state's reliance on fossil fuels and expanding the availability of renewable energy in Vermont. The organization offers technical assistance, holds conferences, publishes newsletters, and provides consumers with Vermont specific information related to available incentives.
- Energy Action Network is an organization that focuses on ending Vermont's reliance on fossil fuels and helping the State meet their goal of 90% renewable energy by 2050. The organization's work is based on directing capital to the renewable energy sector, engaging the public, technology innovation, and regulatory reform.
- Vermont Environmental Consortium provides support for the environmental business sector through advocacy, networking, planning and initiating projects, and creating links to promote research, education, training, and job creation.
- The Renewable Energy Resource Center provides technical support to consumers interested in renewable energy including providing information on incentive programs, economic and environmental benefits, and how to select the right energy system.
- The Renewable Energy Atlas of Vermont offers users the ability to map the various energy options at their location including potential for wind, biomass, geothermal, hydro, and solar. 17
- Solar: Solar photovoltaic (PV) and hot water are the fastest growing forms of renewable energy in Vermont. Additionally, a report released in 2014 identified Vermont as the nation's largest per capital gains in solar-related jobs. Incentives exist in the state to encourage the development of small and large scale solar projects including a net metering performance-based incentive, small-scale renewable energy incentive, funds through the Clean Energy Development Fund, and Green Mountain Power also offers customers a performance-based credit. Installation costs for solar projects have decreased by 50% since 2010 which has created increase demand for it compared to other sources of electricity and has led to the solar industry job growth.
- Wind: Approximately 1.2% of the electric power in Vermont is currently sourced from wind energy. The mountainous topography of Vermont makes it ideal for wind development projects as the best location to site projects are typically found at higher elevations with strong, consistent wind. There have been a number of community wind projects developed including the Searsburg Wind Power facility in southern Vermont and the Harrison Family's Georgia

¹⁷http://www.vtenergyatlas.org/

Mountain Project. The Department of Public Services Energy Plan suggest that there are 20,000 acres in the state that would be suitable for wind energy development projects. ¹⁸ Financial incentives exist for wind projects including the Vermont Small Wind Incentive Program and the Vermont Anemometer Loan Program that provides wind measurement tools to Vermont residents considering a small wind system.

• Biomass: The Comprehensive Energy Plan states that 6% of Vermont's electricity and 14% of the state's heating needs come from biomass fuels. Numerous facilities around the state have started to implement biomass for heating, including the Hartford High School in White River Junction and a major project in Montpelier to provide wood chip-generated heat to downtown buildings. Currently only 4% of the Northeast gets its heat from wood, but increasing the number of people and organizations utilizing biomass for energy will keep more dollars in the local economy and reduce the importing of natural gas and other fossil fuels. The Biomass Energy Resource Center (BERC) reports that heating with wood in the Northeast allows \$0.80 of every dollar spent to stay in the region.¹⁹ Beyond just wood chips, the Vermont Grass Energy Partnership is working to determine the feasibility for grass energy in Vermont and working to identify and respond to challenges in the bioenergy supply chain. Grass energy would allow Vermonters to use a multitude of natural resources that are readily available in the states many pastures and working landscapes.

Smart Meters - Vermont utilities have begun to install new digital meters or "smart meters" due to an ARRA grant from the federal government. The Smart Meters are expected to help customers better understand and reduce their energy usage and improve responsiveness of the utility companies to outages²⁰. The increased utilization of a smart grid and smart metering will have an impact on the IT cluster in the State as there will be demand for companies with the skills to manage, upgrade, and improve the system.

Challenges

- Disconnect between skills of Vermont college graduates and the needs of companies, future occupation demand exists for middle skill (more than high school but less than bachelor's) and for occupations requiring bachelor's and beyond
- Closure of Vermont Yankee and impact on workforce and energy production
- Lack of R&D funding/performance and support for innovation and commercialization
- Upgrades to the distribution systems will need to be made to handle increased demand by large utility-scale renewable energy projects²¹
- Solar: Commercial facilities that want to install PV systems are limiting themselves to less than 150kW to avoid the more lengthy and complex permitting process for systems over that threshold

http://publicservice.vermont.gov/sites/psd/files/Pubs_Plans_Reports/State_Plans/Comp_Energy_Plan/2011/2011 %20CEP Volume%202%5B1%5D.pdf

¹⁸http://publicservice.vermont.gov/sites/psd/files/Pubs_Plans_Reports/State_Plans/Comp_Energy_Plan/2011/201 1%20CEP_Volume%202%5B1%5D.pdf

¹⁹http://www.marketplace.org/topics/economy/new-england-cranks-its-wood-burning-stoves

²⁰http://publicservice.vermont.gov/sites/psd/files/Pubs_Plans_Reports/State_Plans/Comp_Energy_Plan/2011/201 1%20CEP_Volume%202%5B1%5D.pdf)

- Wind: One challenge of the wind industry is identifying sites where the turbines will not
 interfere with the traditional views and landscapes that are expected in Vermont. Additionally,
 the high permitting and construction costs which have an impact on the electricity costs of wind
 power
- Biomass: The siting of a power plant-sized facility is one of the largest challenges for the biomass industry since people do not want these large facilities close to population centers but that is where they would be most effective
- Smart Metering: There is some controversy surrounding smart metering in Vermont as some residents are concerned about the adverse health effects of microwave radiation and potential invasion of privacy. A group of individuals are petitioning Governor Shumlin to place a statewide moratorium on the deployment of the smart meter technology to allow for further research and discussion²². Residents are able to opt-out of the smart meter if they would prefer and studies have determined that smart meters present no health hazard and they comply with the limits set by the FCC by a wide margin²³.

Data Findings

In 2013, total employment in the Energy Cluster in Vermont totaled 13,243 and represented 3.71% of all employment in the state.

In 2012, the latest year for which establishment data is available, there were 1,337 total establishments in the Energy Cluster in Vermont representing 5.4% of all establishments in the state. The average establishment size in the Energy Cluster was 10 employees per establishment compared to an average establishment size of 14.5 in Vermont for all industries.

In terms of industry concentration as measured by national location quotient, the industries that show significant concentration above the national average included Electric Power Distribution (1.92), Other Measuring and Controlling Device Manufacturing (11.79), Other Scientific and Technical Consulting Services (1.23), Environmental Consulting Services (2.44), Nuclear Electric Power Generation (4.51), Other Heavy and Civil Engineering Construction (1.25), All Other Miscellaneous Electrical Equipment and Component Manufacturing (4.76), Plumbing and Heating Equipment and Supplies Merchant Wholesalers (1.49), Heating Equipment Manufacturing (7.15), Primary Battery Manufacturing (5.33), Other Communication and Energy Wire Manufacturing (5.03), Electric Bulk Power Transmission and Control (2.23), Carbon and Graphite Product Manufacturing (5.67), and Hydroelectric Power Generation (2.20).

Between 2008 and 2013, the Energy Cluster gained 614 jobs or a 5% increase. The largest gains were made in the Engineering Services industry (285 new jobs), All Other Miscellaneous Electrical Equipment and Component Manufacturing industry (272 jobs), and the Other Scientific and Technical Consulting Services industry (235 jobs). Overall, the Energy Cluster is projected to increase employment by 13% (1,704 jobs) between 2013 and 2023. Employment increases are projected to be led by Engineering Services (465 jobs to be gained) and Plumbing, Heating and Air-Conditioning Contractors (405 jobs to be gained).

In 2013, top occupations in the Energy Cluster include Electricians (762 jobs) and Plumbers, Pipefitters, and Steamfitters (741 jobs). Between 2013 and 2023, occupation growth in the Energy Cluster is projected to be driven by Plumbers, Pipefitters, and Steamfitters (122 jobs to be gained), Heating, Air

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²² www.stopsmeters.org

²³http://publicservice.vermont.gov/sites/psd/files/Topics/Electric/Smart Grid/Vermont%20DPS%20Smart%20Met er%20Measurement%20Report%20-%20Final.pdf)

Conditioning and Refrigeration Mechanics and Installers (112 jobs to be gained), Management Analysis (93 jobs to be gained), and Electricians (87 jobs to be gained).

Average wages for the Energy Cluster are over \$75,000 and are, therefore, higher than wages in all industries in Vermont, which in 2013 were \$38,401 on average annually. Most occupations in the Energy Cluster require at least an associate's degree with on-the-job training.

Existing Conditions

	Energy Cluster - Current	Employme	ent and Esta	ablishmer	nts		
NAICS	Description	2013 Jobs	% of Cluster	% of VT Jobs	# of Est.	Emp. per Est.	LQ
238220	Plumbing, Heating, and Air- Conditioning Contractors	2,375	17.93%	0.67%	286	8	1.00
238210	Electrical Contractors and Other Wiring Installation Contractors	1,928	14.56%	0.54%	293	7	0.91
541330	Engineering Services	1,674	12.64%	0.47%	258	6	0.74
221122	Electric Power Distribution	936	7.07%	0.26%	24	39	1.92
334519	Other Measuring and Controlling Device Manufacturing	866	6.54%	0.24%	4	217	11.79
541690	Other Scientific and Technical Consulting Services	739	5.58%	0.21%	79	9	1.23
541620	Environmental Consulting Services	581	4.39%	0.16%	61	10	2.44
221113	Nuclear Electric Power Generation	560	4.23%	0.16%	1	560	4.51
237990	Other Heavy and Civil Engineering Construction	357	2.70%	0.10%	26	14	1.25
237110	Water and Sewer Line and Related Structures Construction	350	2.64%	0.10%	39	9	0.89
237130	Power and Communication Line and Related Structures Construction	324	2.45%	0.09%	42	8	0.83
335999	All Other Miscellaneous Electrical Equipment and Component Manufacturing	315	2.38%	0.09%	5	63	4.76
423720	Plumbing and Heating Equipment and Supplies (Hydronics) Merchant Wholesalers	291	2.20%	0.08%	34	9	1.49
333414	Heating Equipment (except Warm Air Furnaces) Manufacturing	281	2.12%	0.08%	6	47	7.15
423610	Electrical Apparatus and Equipment, Wiring Supplies, and Related Equipment Merchant Wholesalers	276	2.08%	0.08%	40	7	0.78
541712	Research and Development in the Physical, Engineering, and Life Sciences (except Biotechnology)	234	1.77%	0.07%	49	5	0.22
541380	Testing Laboratories	183	1.38%	0.05%	26	7	0.47
335912	Primary Battery Manufacturing	151	1.14%	0.04%	1	151	5.33
335929	Other Communication and Energy Wire Manufacturing	150	1.13%	0.04%	3	50	5.03
221121	Electric Bulk Power Transmission and Control	134	1.01%	0.04%	2	67	2.23
221210	Natural Gas Distribution	129	0.97%	0.04%	1	129	0.49

335991	Carbon and Graphite Product Manufacturing	99	0.75%	0.03%	2	50	5.67
333611	Turbine and Turbine Generator Set Units Manufacturing	60	0.45%	0.02%	1	60	0.89
423690	Other Electronic Parts and Equipment Merchant Wholesalers	60	0.45%	0.02%	33	2	0.17
335314	Relay and Industrial Control Manufacturing	50	0.38%	0.01%	2	25	0.46
541360	Geophysical Surveying and Mapping Services	44	0.33%	0.01%	5	9	0.91
221111	Hydroelectric Power Generation	31	0.23%	0.01%	6	5	2.20
335931	Current-Carrying Wiring Device Manufacturing	25	0.19%	0.01%	0	25	0.34
237120	Oil and Gas Pipeline and Related Structures Construction	21	0.16%	0.01%	4	5	0.06
221119	Other Electric Power Generation	14	0.11%	0.00%	5	3	0.78
Energy (Cluster Total	13,243	100.00%	3.71%	1,337	10	

Source: QCEW Employees, Non-QCEW Employees & Self-Employed - EMSI 2013.4 Class of Worker

Note: Industries with fewer than 10 employees not included

Industry Data *Historic 2008-2013*

	Energy Cluster - Historic Growth									
NAICS	Description	2008 Jobs	2013 Jobs	# Change	% Change					
541330	Engineering Services	1,389	1,674	285	21%					
335999	All Other Miscellaneous Electrical Equipment and Component Manufacturing	43	315	272	633%					
541690	Other Scientific and Technical Consulting Services	504	739	235	47%					
237130	Power and Communication Line and Related Structures Construction	194	324	130	67%					
541620	Environmental Consulting Services	491	581	90	18%					
335991	Carbon and Graphite Product Manufacturing	16	99	83	519%					
333414	Heating Equipment (except Warm Air Furnaces) Manufacturing	206	281	75	36%					
423610	Electrical Apparatus and Equipment, Wiring Supplies, and Related Equipment Merchant Wholesalers	224	276	52	23%					
334519	Other Measuring and Controlling Device Manufacturing	816	866	50	6%					
333611	Turbine and Turbine Generator Set Units Manufacturing	16	60	44	275%					
221113	Nuclear Electric Power Generation	519	560	41	8%					
541360	Geophysical Surveying and Mapping Services	23	44	21	91%					
221121	Electric Bulk Power Transmission and Control	117	134	17	15%					
221122	Electric Power Distribution	919	936	17	2%					
221210	Natural Gas Distribution	112	129	17	15%					

237120	Oil and Gas Pipeline and Related Structures Construction	<10	21	16	320%
237120	Oil and Gas Pipeline and Related Structures Construction	9	21	12	133%
335931	Current-Carrying Wiring Device Manufacturing	17	25	8	47%
237110	Water and Sewer Line and Related Structures Construction	346	350	4	1%
221119	Other Electric Power Generation	13	14	1	8%
221111	Hydroelectric Power Generation	31	31	0	0%
335314	Relay and Industrial Control Manufacturing	58	50	(8)	-14%
335929	Other Communication and Energy Wire Manufacturing	173	150	(23)	-13%
541380	Testing Laboratories	219	183	(36)	-16%
335912	Primary Battery Manufacturing	189	151	(38)	-20%
423690	Other Electronic Parts and Equipment Merchant Wholesalers	115	60	(55)	-48%
335311	Power, Distribution, and Specialty Transformer Manufacturing	57	0	(57)	-100%
541712	Research and Development in the Physical, Engineering, and Life Sciences (except Biotechnology)	291	234	(57)	-20%
237990	Other Heavy and Civil Engineering Construction	469	357	(112)	-24%
238210	Electrical Contractors and Other Wiring Installation Contractors	2,052	1,928	(124)	-6%
238220	Plumbing, Heating, and Air-Conditioning Contractors	2,525	2,375	(150)	-6%
423720	Plumbing and Heating Equipment and Supplies (Hydronics) Merchant Wholesalers	472	291	(181)	-38%
Energy (Cluster Total	12,629	13,243	614	5%

Source: QCEW Employees, Non-QCEW Employees & Self-Employed - EMSI 2013.4 Class of Worker Note: Industries with fewer than 10 employees in 2008 and 2013 not included. For industries with fewer than 10 employees in only one year, analyst assumes 5 employees for purposes of calculation.

Projected 2013-2023

	Energy Cluster - Projected Growth									
NAICS	Description	2013 Jobs	2023 Jobs	# Change	% Change					
541330	Engineering Services	1,674	2,139	465	28%					
238220	Plumbing, Heating, and Air-Conditioning Contractors	2,375	2,780	405	17%					
541690	Other Scientific and Technical Consulting Services	739	1,060	321	43%					
541620	Environmental Consulting Services	581	868	287	49%					
237130	Power and Communication Line and Related Structures Construction	324	527	203	63%					
335999	All Other Miscellaneous Electrical Equipment and Component Manufacturing	315	445	130	41%					

238210	Electrical Contractors and Other Wiring Installation Contractors	1,928	2,057	129	7%
334519	Other Measuring and Controlling Device Manufacturing	866	983	117	14%
333414	Heating Equipment (except Warm Air Furnaces) Manufacturing	281	379	98	35%
423610	Electrical Apparatus and Equipment, Wiring Supplies, and Related Equipment Merchant Wholesalers	276	343	67	24%
221210	Natural Gas Distribution	129	168	39	30%
541360	Geophysical Surveying and Mapping Services	44	74	30	68%
335991	Carbon and Graphite Product Manufacturing	99	125	26	26%
335931	Current-Carrying Wiring Device Manufacturing	25	36	11	44%
333611	Turbine and Turbine Generator Set Units Manufacturing	60	60	0	0%
221121	Electric Bulk Power Transmission and Control	134	131	(3)	-2%
221119	Other Electric Power Generation	14	9	(5)	-36%
221122	Electric Power Distribution	936	930	(6)	-1%
335314	Relay and Industrial Control Manufacturing	50	43	(7)	-14%
237120	Oil and Gas Pipeline and Related Structures Construction	21	9	(12)	-57%
237110	Water and Sewer Line and Related Structures Construction	350	336	(14)	-4%
237120	Oil and Gas Pipeline and Related Structures Construction	21	<10	(16)	-76%
221113	Nuclear Electric Power Generation	560	534	(26)	-5%
541712	Research and Development in the Physical, Engineering, and Life Sciences (except Biotechnology)	234	205	(29)	-12%
221111	Hydroelectric Power Generation	31	0	(31)	-100%
423720	Plumbing and Heating Equipment and Supplies (Hydronics) Merchant Wholesalers	291	260	(31)	-11%
541380	Testing Laboratories	183	148	(35)	-19%
423690	Other Electronic Parts and Equipment Merchant Wholesalers	60	13	(47)	-78%
335929	Other Communication and Energy Wire Manufacturing	150	84	(66)	-44%
335912	Primary Battery Manufacturing	151	30	(121)	-80%
237990	Other Heavy and Civil Engineering Construction	357	179	(178)	-50%
Energy Cluster Total		13,243	14,947	1,704	13%

Source: QCEW Employees, Non-QCEW Employees & Self-Employed - EMSI 2013.4 Class of Worker Note: Industries with fewer than 10 employees in 2013 and 2023 not included. For industries with fewer than 10 employees in only one year, analyst assumes 5 employees for purposes of calculation.

Occupation Data

Energy Cluster - Occupation Analysis (20 largest)						
SOC	Occupation	2013 Jobs	Annual Wages	Education Required		

47-2111	Electricians	762	\$35,960	Long-term on-the-job training
47-2152	Plumbers, Pipefitters, and Steamfitters	741	\$37,820	Long-term on-the-job training
49-9051	Electrical Power-Line Installers and Repairers	383	\$61,720	Long-term on-the-job training
49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	367	\$38,500	Postsecondary non-degree award
47-2061	Construction Laborers	355	\$26,040	Short-term on-the-job training
47-1011	First-Line Supervisors of Construction Trades and Extraction Workers	354	\$45,060	Work experience in a related occupation
43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	309	\$29,900	Short-term on-the-job training
47-2031	Carpenters	266	\$34,160	Long-term on-the-job training
13-1111	Management Analysts	262	\$49,320	Bachelor's or higher degree, plus work experience
3-3031	Bookkeeping, Accounting, and Auditing Clerks	249	\$33,200	Moderate-term on-the-job training
47-3013	HelpersElectricians	241	\$27,460	Short-term on-the-job training
17-2051	Civil Engineers	217	\$60,440	Bachelor's degree
11-9021	Construction Managers	207	\$47,560	Bachelor's degree
11-1021	General and Operations Managers	203	\$79,200	Bachelor's or higher degree, plus work experience
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	185	\$49,740	Moderate-term on-the-job training
47-2211	Sheet Metal Workers	183	\$38,620	Long-term on-the-job training
17-3023	Electrical and Electronics Engineering Technicians	174	\$64,220	Associate's degree
51-2022	Electrical and Electronic Equipment Assemblers	173	\$27,400	Short-term on-the-job training
51-2092	Team Assemblers	172	\$27,800	Moderate-term on-the-job training
11-9041	Architectural and Engineering Managers	170	\$104,020	Bachelor's or higher degree, plus work experience

Source: QCEW Employees, Non-QCEW Employees & Self-Employed - EMSI 2013.4 Class of Worker

Note: Annual wages based on 2,000 hours per year

Historic 2008-2013

Energy Cluster - Historic Occupation Growth (Top 20 Largest Growth)						
SOC	Occupation	2008 Jobs	2013 Jobs	# Change	% Change	
Total	All Cluster Occupations	11,870	12,494	624	5%	
13-1111	Management Analysts	212	262	50	24%	
49-9051	Electrical Power-Line Installers and Repairers	337	383	46	14%	

17-1011	Architects, Except Landscape and Naval	53	97	44	83%
13-1161	Market Research Analysts and Marketing Specialists	94	131	37	39%
51-2092	Team Assemblers	140	172	32	23%
17-2051	Civil Engineers	186	217	31	17%
51-2022	Electrical and Electronic Equipment Assemblers	143	173	30	21%
11-9199	Managers, All Other	80	103	23	29%
19-2041	Environmental Scientists and Specialists, Including Health	125	146	21	17%
11-9041	Architectural and Engineering Managers	150	170	20	13%
49-9052	Telecommunications Line Installers and Repairers	105	125	20	19%
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	85	105	20	24%
51-4021	Extruding and Drawing Machine Setters, Operators, and Tenders, Metal and Plastic	22	42	20	91%
47-4011	Construction and Building Inspectors	49	67	18	37%
51-1011	First-Line Supervisors of Production and Operating Workers	97	114	17	18%
17-3023	Electrical and Electronics Engineering Technicians	159	174	15	9%
13-2011	Accountants and Auditors	133	148	15	11%
51-4011	Computer-Controlled Machine Tool Operators, Metal and Plastic	28	41	13	46%
17-2199	Engineers, All Other	26	39	13	50%
15-1142	Network and Computer Systems Administrators	68	80	12	18%

Source: QCEW Employees, Non-QCEW Employees & Self-Employed - EMSI 2013.4 Class of Worker

Projected 2013-2023

Energy Cluster - Projected Occupation Growth (Top 20 Largest Growth)							
SOC	Occupation	2013 Jobs	2023 Jobs	# Change	% Change		
Total	All Cluster Occupations	12,494	14,163	1,669	13%		
47-2152	Plumbers, Pipefitters, and Steamfitters	741	863	122	16%		
49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	367	479	112	31%		
13-1111	Management Analysts	262	355	93	35%		
47-2111	Electricians	762	849	87	11%		
17-2051	Civil Engineers	217	278	61	28%		
13-1161	Market Research Analysts and Marketing Specialists	131	184	53	40%		
17-1011	Architects, Except Landscape and Naval	97	144	47	48%		
49-9051	Electrical Power-Line Installers and Repairers	383	421	38	10%		

43-9061	Office Clerks, General	97	132	35	36%
49-9052	Telecommunications Line Installers and Repairers	125	159	34	27%
43-3031	Bookkeeping, Accounting, and Auditing Clerks	249	278	29	12%
47-3015	HelpersPipelayers, Plumbers, Pipefitters, and Steamfitters	103	132	29	28%
15-1133	Software Developers, Systems Software	92	118	26	28%
47-4011	Construction and Building Inspectors	67	92	25	37%
11-9199	Managers, All Other	103	127	24	23%
19-2041	Environmental Scientists and Specialists, Including Health	146	169	23	16%
41-3099	Sales Representatives, Services, All Other	68	91	23	34%
47-3013	HelpersElectricians	241	264	23	10%
51-2092	Team Assemblers	172	194	22	13%
13-2011	Accountants and Auditors	148	170	22	15%

Source: QCEW Employees, Non-QCEW Employees & Self-Employed - EMSI 2013.4 Class of

Worker

Market Research

The Energy Cluster accounts for approximately 4% of the total employment in the state and includes a wide variety of industries and occupations. The State's interest in being a leader in green technology and alternative energy suggests that this cluster warrants additional research into some of the key opportunities for future economic development growth. It is interesting to note that the alternative energy industry received \$84 million in venture capital between 2005 and 2010, which is over 70% of the total \$118 million that all industries throughout the state received during that same time period.²⁴

Additional research was conducted into the following industries:

- Solar Power
- Wind Power
- Biomass
- Environmental Consulting Services
- Scientific and Economic Consulting
- Navigational, Measuring, and Control Instrument Manufacturing

The following section provides additional information about these industries.

<u>Solar Power</u>: Firms in this industry own and operate solar-power generating facilities in the form of either photovoltaic panels or solar thermal power stations that make use of mirrors or lenses to concentrate energy from the sun. Firms then sell the energy to downstream customers. Solar farms are within this industry.

The Solar Power industry has experienced gains over the five years to 2013. Generous government incentives have propelled revenue growth by enacting renewable portfolio standards (RPSs) and providing tax credits for companies that invest in solar power. These standards, implemented in 30

²⁴ Ibid

states, require local utilities to generate electricity from renewable power as a percentage of their total energy portfolio. Increased campaigning for green technology has also influenced industry performance by sparking interest in technologies that replace pollutant-generating energy sources (coal and gas). In light of these trends, industry revenue is expected to grow at an average annual rate of 28.7% over the five years to 2013 to total \$165.2 million, including a 10.1% jump in 2013.

Government assistance will continue to help the industry compete with other energy-generation technologies in the next five years by lowering the cost of solar projects. State mandates for renewable-energy power will continue to translate into higher industry revenue. Additionally, recovering U.S. economic growth in the five years to 2018 will contribute to more robust demand for electricity generators. As consumer income rises alongside business investment expenditures, demand for electricity will continue to increase. As a result, industry firms are expected to benefit from the continued push toward renewable-power generation, incurring increased solar-power output. Given these conditions, industry revenue is projected to grow an average 5.7% per year over the next five years to total \$217.6 million in 2018.

Examples of businesses working in the solar industry including: groSolar, and suncommon.

The information in this section is sourced directly and solely from IBISWorld.

<u>Wind Power</u>: Companies in this industry operate wind farms, which consist of wind-operated turbines used to generate electricity.

The Wind Power industry is booming. Revenue is expected to increase at an average annual rate of 16.9% to \$6.9 billion in the five years to 2013, including anticipated growth of 8.6% in 2013. Favorable government assistance has made this energy source cost competitive with other electricity-generation sources, lifting wind power's share of the total electricity generated in the United States from 0.4% in 2005 to 3.2% in 2012. The industry generates revenue from owning and operating wind farms and selling the energy produced to downstream customers.

The federal government's investment tax credits and state government mandates for renewable energy have made it attractive for operators to construct wind farms at a breakneck pace. These incentives lower the cost of wind power generation, ultimately making it cheaper for mandated utility companies to purchase or invest in renewable energy. Cash credits for renewable energy investment were extended only until December 31, 2011, encouraging companies to open wind farms quickly before the expiration of the cash grant program. The production tax credit, a government-funded incentive that pays producers per unit of energy sold, has also aided this trend. The U.S. Congress recently extended this credit as a part of the American Taxpayer Relief Act, following a brief expiration at the end of 2012.

Over the next five years, stronger economic activity and a focus on energy independence and reducing greenhouse gas emissions will contribute to strong ongoing growth in wind power production. Combined with favorable government assistance, the industry will ride the high winds as the economy kicks back in gear and electricity demand rises. A push for the creation of offshore wind farms is also expected to aid the Wind Power industry. The first such farm in the United States received federal clearance in August 2012. As a result of these trends, revenue in the Wind Power industry is expected to grow at an annualized rate of 9.6% to \$10.8 billion during the five years to 2018.

There are two companies currently classified under this industry including Green Mountain Power and Windstream Power; however, the data is only showing 1 and 4 employees, respectively. Additional companies including Wind Turbines of Vermont.

The information in this section is sourced directly and solely from IBISWorld.

<u>Biomass</u>: Firms in this industry operate electricity generating facilities (other than wind power and solar power), using biomass (e.g. agricultural byproducts, landfill gas and biogenic municipal waste).

The Biomass Power industry has grown at a healthy rate in the five years to 2013. The federal government has propelled this growth with the implementation of tax credits through several pieces of legislation, including the American Recovery and Reinvestment Act of 2009, that encourage the expansion of biomass power facilities. Furthermore, the majority of states have enacted renewable portfolio standards (RPSs), which require local utilities to generate electricity from renewable power as a percentage of their total energy portfolio. Increased campaigning for green technology also has influenced industry performance by sparking interest in technologies that replace pollutant-generating energy sources, such as coal and gas. As a result, industry revenue is expected to increase at an annualized rate of 9.5% over the five years to 2013 to total \$820.3 million, including an 8.8% jump in 2013.

Federal government assistance and local government regulation regarding renewable energy has led to considerable growth in biomass power projects. The increase in projects reflects a triumph for government assistance in the industry, which normally meets difficulty competing against traditional energy-generation commodities, such as natural gas and oil. The assistance, provided in the form of federal tax credits and RPSs, has boosted biomass-electricity generation and helped it reach a level where it can compete with traditional energy sources. However, federal production tax credits for biomass power are set to expire at the end of 2013, which is expected to hinder growth going forward. Furthermore, many states have found that emissions from biomass power generation actually exceed those of coal power generation, which will likely diminish RPSs that directly benefit biomass power over the next five years.

Nevertheless, state and local government assistance is expected to continue to help industry players compete with other energy-generation technologies in the next five years by lowering the cost of biomass projects. Additionally, the anticipated economic recovery over the next five years will contribute to more robust demand for electricity generators. As a result, industry firms are expected to benefit from the continued push toward renewable-power generation, which will lead to increased biomass-power output. Given these conditions, industry revenue is forecast to increase at an annualized rate of 4.7% per year over the next five years to total \$1.0 billion in 2018.

Examples of organizations working within the biomass industry include the Biomass Energy Resource Center, Sunwood Systems, Tarm Biomas, and New England Wood Pellet.

The information in this section is sourced directly and solely from IBISWorld.

<u>Environmental Consulting Services (NAICS 541620)</u>: This industry provides advice to businesses and federal governments on environmental issues, such as controlling environmental contamination from pollutants, toxic substances, and hazardous materials. Environmental consultants identify problems, measure and evaluate risks, and recommend solutions. The industry employs an interdisciplinary staff of scientists, engineers, and other technicians. Environmental Consulting Services in Vermont has a national location quotient of 2.44, indicating a high concentration of employees in this industry compared to the national average.

Firms in the Environmental Consulting Services industry provide advisory services such as environmental assessments, site remediation planning, waste management, and natural resource management services. Firms assist construction, manufacturing, and other industries to mitigate their impact on the surrounding environment and navigate changing legislation and regulations.

The future of environmental consulting is promising. Increased environmental regulations are anticipated, particularly in the areas of oil drilling and energy dependence. Customers will increasingly demand the industry's services for advice about drilling offshore and for aid in becoming more energy-efficient and adopting renewable energy. Corporate profit is expected to grow at an average annual rate of 4.3% over the next five years through 2018, allowing companies to allocate more resources toward

implementing sustainable practices and promoting positive public images. Industry firms will also aid construction companies to meet new environmental standards as construction activity picks up. Consequently, revenue is forecast to grow at an average rate of 5.9% per year to total \$22.2 billion in the five years to 2018.

Examples of companies involved with this industry include Techtron Environmental, Pioneer Environmental Associates, Simon Operation Services, Environmental Compliance Services, Bear Creek Environmental, and Clay Point Associates.

Scientific and Economic Consulting (NAICS 541690): Companies in this industry provide advice and assistance to businesses and other organizations on scientific and technical issues. The industry includes a range of specialist consulting activities, primarily in the areas of economic, energy and mineral, security, and agricultural analysis. This industry excludes establishments that derive their revenue primarily from environmental consulting and remediation, geophysical surveying and mapping, or oil and gas exploration. The Scientific and Economic Consulting industry has a national location quotient of 1.23, suggesting the industry is more concentrated in Vermont compared to the nation.

The primary disciplines within this industry are: economic consulting services; horticultural consulting services; agricultural, agrology and agronomy consulting services; livestock breeding consulting services; biological consulting services; alternative energy consulting services; scientific (i.e. physics/chemistry) consulting services; safety consulting services; energy consulting services; and security consulting services.

The Scientific and Economic Consulting industry has experienced impressive growth over the past five years, weathering an economy that nearly toppled a number of related industries. The industry's diverse range of markets with varying degrees of specialization in products and services have allowed it to sustain growth in a period of difficult economic conditions. The industry experienced losses in 2008; however, increasing demand from the federal government and private firms seeking greater assistance provided new opportunities. Additionally, the industry grew as a result of increased demand from mining and energy firms that required feasibility studies and other advisory services. Outside of a decline in 2008, the industry has experienced a rising number of businesses, particularly non-employers (i.e. sole practitioners). These firms have taken advantage of low barriers to entry to capture high industry profit margins. Overall, the industry is forecast to grow by an average annual rate of 6.2% over the five years to 2013.

Improving economic conditions are expected to provide the industry with stronger growth over the next five years. Improving consumer sentiment and household disposable income is forecast to increase corporate profit margins, creating demand for scientific and economic consultants. Specialized areas of consulting, such as genomics and pharmaceuticals, are also likely to be a source of strong growth for consultants in this industry. In addition, firms are expected to become more profitable over the next five years, attracting numerous new firms to enter the industry. Larger players are expected to pursue mergers and acquisitions to increase market share; however, the industry will remain highly fragmented due to an increase in the number of non-employer firms. As a result, the industry is projected to grow by an annualized rate of 6.5% over the five years through 2018 to \$37.5 billion.

Examples of organizations involved with this industry include Vermont Energy Investment Corporation, Wagner, Heindel & Noyes, New England Research, Burrells Corporation, and Ard Inc.

The information in this section is sourced directly and solely from IBISWorld.

<u>Navigational, Measuring, and Control Instrument Manufacturing</u>: See description of this industry in the Manufacturing and Aerospace Cluster section.

Insights from Previous Reports

The following is an overview of information from a review of previous reports as they relate to the Energy Cluster in Vermont.

Vermont's Energy Future – 2011 Comprehensive Energy Plan

There is potential to grow the alternative energy aspect of the Energy Cluster as the State intends to grow the use of renewable energy setting a goal of 90% of the state's energy coming from renewable sources by 2050. The Comprehensive Energy Plan recognizes the impact that pursuing alternative and renewable energy sources could have on the local economy in terms of job creation and keeping dollars closer to home. ²⁵

The Comprehensive Plan notes the importance of developing and implementing Plug-in Electric Vehicle (PEV) infrastructure to support the use of PEV's throughout the state.²⁶

The Green Economy and Environmental Enterprises in Vermont: Opportunities for the 21st Century

This report was prepared by the Snelling Center for Government and the Greater Burlington Industrial Corporate to identify ways to advance the green economy in Vermont. The Energy Cluster can fall into the green economy in terms of the need to support innovation, research and development, and entrepreneurial activities related to energy. The report notes the importance of raising "Vermont's profile as a hub of environmental integrity, innovation and opportunity" which can be done through the development of alternative energy sources.

The Clean Energy Development Fund

A review of Vermont's Clean Energy Development Fund was also conducted. The CEDF was created in 2005 with the purpose of "increasing the development and deployment of cost-effective and environmentally sustainable electric power resources – primarily with respect to renewable energy resources, and the use of combined heat and power technologies - in Vermont."²⁷ They offer funding opportunities to businesses and organizations involved in clean energy projects. During 2012, over \$5.7 million was awarded to projects across the state. The CEDF plays a role in advancing the development of renewable energy technologies including PV, solar thermal, wind systems, and biomass projects. ²⁸

²⁵ Vermont's Energy Future – 2011 Comprehensive Energy Plan.
http://publicservice.vermont.gov/sites/psd/files/Pubs Plans Reports/State Plans/Comp Energy Plan/2011/CEP% 200verview%20Page Final%5B1%5D.pdf
²⁶ Ibid

²⁷ Clean Energy Development Fund website. http://publicservice.vermont.gov/topics/renewable_energy/cedf

²⁸ Clean Energy Development Fund Annual Report to the Vermont Legislature, Fiscal Year 2012. http://publicservice.vermont.gov/sites/psd/files/CEDF%20Annual%20Report FY%202012.pdf

Food Production and Value Added Processing

Cluster Description

The Food Production and Value Added Processing Cluster, which is defined as the production, processing, and distribution of agricultural products, is an industry that has been important in the state of Vermont especially as it relates to specialized food production and the increased demand for product diversification. The food manufacturing and processing industry is a major part of the Vermont economy with a number of nationally recognized brands that have manufacturing operations in Vermont, including Ben and Jerry's ice cream, Magic Hat brewery, Cabot cheese, Green Mountain Coffee and more. There are a number of facilities throughout Vermont that offer facilities to food production entrepreneurs such as Vermont Food Venture Center which is a multi-use processing facility that provides incubation and support services such as recipe and process development, co-packing services, value added processing for farms and other assistance. These types of incubators and test kitchens help further the Food Production and Value Added Processing Cluster which is filled with small businesses that may not have the capacity to rent their own facilities but need access in order to perfect their process, expand their offerings, and sell to the public.

The State has a long history of farming and agriculture but recently there has been a movement for farmers to begin diversifying their products to make them more marketable. The chance for farmers to get into niche product markets can help them earn a higher premium on their products and thus increase their odds of survival in this era of conventional farming and government subsidies for large farms. The State's reputation for high quality agricultural products could very well prove to be helpful to build a brand around food that is "Made in Vermont".

As part of this cluster analysis the Farm-to-Plate Strategic Plan and the Vermont Food System Atlas was reviewed. Specific attention was paid to the strategic goals and objectives identified in that plan as well as the vast research that was conducted. This cluster analysis will build off of that research.

The following table contains a list of the industries included in this analysis of the Food Production and Value Added Processing Cluster.²⁹³⁰Note that we recognize that not all industry subsectors, below, are present in a meaningful way in the state.

	Food Production and Value Added Processing Cluster				
NAICS	Description				
Code	·				
111000	Crop Production				
112000	Animal Production				
115111	Cotton Ginning				
115112	Soil Preparation, Planting, and Cultivating				
115113	Crop Harvesting, Primarily by Machine				
115114	Postharvest Crop Activities (except Cotton Ginning)				

²⁹ Note: The Farm-to-Plate Strategic Plan that was created for Vermont uses a different definition to describe the Agriculture Cluster. Our analysis focuses strictly on the actual growing of the inputs and the manufacturing of the value added goods and does not include distribution systems, restaurants, or any other aspects of the food system. While we recognize the important role that restaurants play in the food system, this analysis does not include "Restaurants" in the cluster because it would be difficult to separate out the restaurants that are truly a part of the state's food system (example Claire's in Hardwick) and those that are not (example Subway or 99 Restaurant). The analysts have reviewed the material in the Farm-to-Plate Strategic Plan, recognize its importance, and have used it in developing the findings of the cluster.

³⁰EMSI combines all NAICS categories under 111 (Crop production) and 112 (Animal production) under a single code, 11A000, due to the paucity of detailed and complete agricultural employment data, as well as for compatibility with categories used for input-output modeling.

115115	Farm Labor Contractors and Crew Leaders
115116	Farm Management Services
311111	Dog and Cat Food Manufacturing
311119	Other Animal Food Manufacturing
311211	Flour Milling
311212	Rice Milling
311213	Malt Manufacturing
311221	Wet Corn Milling
311222	Soybean Processing
311223	Other Oilseed Processing
311225	Fats and Oils Refining and Blending
311230	Breakfast Cereal Manufacturing
311311	Sugarcane Mills
311312	Cane Sugar Refining
311313	Beet Sugar Manufacturing
311320	Chocolate and Confectionery Manufacturing from Cacao Beans
311330	Confectionery Manufacturing from Purchased Chocolate
311340	Nonchocolate Confectionery Manufacturing
311411	Frozen Fruit, Juice, and Vegetable Manufacturing
311412	Frozen Specialty Food Manufacturing
311421	Fruit and Vegetable Canning
311422	Specialty Canning
311423	Dried and Dehydrated Food Manufacturing
311511	Fluid Milk Manufacturing
311512	Creamery Butter Manufacturing
311513	Cheese Manufacturing
311514	Dry, Condensed, and Evaporated Dairy Product Manufacturing
311520	Ice Cream and Frozen Dessert Manufacturing
311611	Animal (except Poultry) Slaughtering
311612	Meat Processed from Carcasses
311613	Rendering and Meat Byproduct Processing
311615	Poultry Processing
311811	Retail Bakeries
311812	Commercial Bakeries
311813	Frozen Cakes, Pies, and Other Pastries Manufacturing
311821	Cookie and Cracker Manufacturing
311822	Flour Mixes and Dough Manufacturing from Purchased Flour
311823	Dry Pasta Manufacturing
311830	•
	Tortilla Manufacturing
311911	Roasted Nuts and Peanut Butter Manufacturing
311919	Other Snack Food Manufacturing
311920	Coffee and Tea Manufacturing
311930	Flavoring Syrup and Concentrate Manufacturing
311941	Mayonnaise, Dressing, and Other Prepared Sauce Manufacturing
311942	Spice and Extract Manufacturing
311991	Perishable Prepared Food Manufacturing
311999	All Other Miscellaneous Food Manufacturing
312111	Soft Drink Manufacturing
312112	Bottled Water Manufacturing
312113	Ice Manufacturing

312120	Breweries
312130	Wineries
312140	Distilleries
312210	Tobacco Stemming and Redrying
312221	Cigarette Manufacturing
312229	Other Tobacco Product Manufacturing
325311	Nitrogenous Fertilizer Manufacturing
325312	Phosphatic Fertilizer Manufacturing
325314	Fertilizer (Mixing Only) Manufacturing
325320	Pesticide and Other Agricultural Chemical Manufacturing
333111	Farm Machinery and Equipment Manufacturing
333112	Lawn and Garden Tractor and Home Lawn and Garden Equipment Manufacturing
333294	Food Product Machinery Manufacturing
423820	Farm and Garden Machinery and Equipment Merchant Wholesalers
424510	Grain and Field Bean Merchant Wholesalers
424520	Livestock Merchant Wholesalers
424590	Other Farm Product Raw Material Merchant Wholesalers
424910	Farm Supplies Merchant Wholesalers

Summary and Conclusions

Assets

- Good fit for Vermont in terms of brand, values, image and overall historic workforce and networks. Strong fit with Vermont's strength in growing independent "grow your own" businesses as well as culture of self-reliance.
- Good fit for Vermont in terms of brand, values, image and overall historic workforce and networks.
- Organization support for the industry through the Farm to Plate Network and Vermont Food System Atlas.
- An increase in demand for organic, healthy, and locally produced goods has supported the
 growth of niche food producers throughout Vermont. The market has supported increasing
 opportunities for producers and entrepreneurs throughout the state and has led to sustainable
 smaller companies as well as large well known, national brands.
- The evidence exists to suggest that small, "mom and pop" type of specialty manufacturing companies are attracted to Vermont and New Hampshire due to the historic focus on agriculture.
- Literature research and data point to the fact that the greenhouse industry (as a subsector of agriculture) could be a potential target for the State.
- "Made in Vermont" brand is recognizable and, if enhanced and promoted regionally, could lead to increased pricing power and hence profit margins for producers throughout the State.
- Good access to raw materials for a variety of food production and value added processing.
- Existing "Farm to Plate Strategic Plan" that provides detailed assessment and strategies for the State.

- Historic and projected growth in the cluster particularly in beverages such as Coffee and Tea Manufacturing, Breweries, and Wineries. We recognize that growth in the Coffee and Tea Manufacturing industry is likely driven by Green Mountain Coffee Roasters.
- Continued support of food production entrepreneurs throughout the state through incubators, test kitchens, and co-op facilities.
- Vermont's maple syrup production is the largest in the United States and is a very fast growing sector. ³¹
- Internationally known producer of artisanal cheeses and unique training programs including through Jasper Hill.
- The Vermont Higher Education Food System Consortium will grow capacity for Vermont to be a world class destination for food and food system management.
- Vermont slaughterhouses practice humane handling which is unique and appreciated by certain consumers.

Challenges

- Cost barrier of locally produced, small-scale production. This can be a disadvantage for consumers, making it difficult for producers to compete.
- Climate change and extreme weather can severely impact annual crop production.
- Increasing centralization of the food industry under major umbrellas make it difficult for small operations to compete.
- Concentration of industry growth and employment in a few specific companies on the food manufacturing side and concentration of dairy acreage on the agriculture side. This tends to skew the data and overstate opportunities in cluster.
- Low wages and seasonal work associated with this industry can make it unattractive to workers, putting a strain on organizations looking to fill positions.

Data Findings

In 2013, employment in the Food Production and Value Added Processing Cluster in Vermont totaled 11,666, or 3.27% of total employment in Vermont in 2013. Note that counting employees in the Food Production and Value Added Processing Cluster is difficult due to the seasonality and variety of classifications that farmers and food production firms use. The data collected from EMSI is complemented by information pulled from the United States Department of Agriculture Census.

In 2007, the latest year for which the Agriculture Census data is available, there were just under 7,000 farms in Vermont with an average size of 177 acres. The EMSI data reports there are 587 establishments operating under the Food Production and Value Added Processing Cluster, including animal and crop production, breweries, distilleries, food manufacturing, etc.

In terms of industry concentration, as measured by national location quotients, there are quite a few industries within this cluster that have a concentration significantly above the national average, including Animal Production (3.04), Coffee and Tea Manufacturing (31.11), Confectionery Manufacturing

from Purchased Chocolate (4.66), Cheese Manufacturing (3.07), Breweries (4.00), Food Product Machinery Manufacturing (2.49), and others.

Between 2008 and 2013, the Food Production Cluster increased employment by 16% (1,594 jobs). Gains were driven primarily by Coffee and Tea Manufacturing (930 jobs gained), Fluid Milk Manufacturing and Ice Cream and Frozen Dessert Manufacturing also saw growth during this period. Overall the Food Production Cluster growth is expected to slow somewhat by 2023, with a 5% increase projected, or 617 jobs, to be added between 2013 and 2023.³² Employment increases are projected to be led by Coffee and Tea Manufacturing, projected to gain over 650 jobs (note that this projected increase is based on historic growth at Green Mountain Coffee Roasters).

In 2013, top occupations in the Food Production Cluster include Farmers, Ranchers, and Other Agricultural Managers (2,417 jobs), Farmworkers and Laborers, Crop, Nursery, and Greenhouse (1,432 jobs), and Packaging and Filling Machine Operators and Tenders (999 jobs).

Between 2013 and 2023, occupation growth in the Food Production Cluster is projected to be driven by Farmworkers and Laborers (121 jobs to be gained), Packaging and Filling Machine Operators and Tenders (60 jobs to be gained), and Bakers (46 jobs to be gained).

Wages in the Food Production Cluster are typically lower than the average wage of \$38,401 across all industries in Vermont in 2013. In fact, only two of the top 20 occupations in the Food Production Cluster had higher wages than the average for Vermont as a whole in 2013. Most occupations in the Food Production Cluster require only on-the-job training, but as farm and production work becomes more technical, the amount of training required for these positions will likely shift as well.

Existing Conditions

Food Production and Value Added Processing Cluster - Current Employment and Establishments % of Emp. 2013 % of # of **NAICS** Description VT LQ per Jobs Cluster Est. Jobs Est. 112000 **Animal Production** 3,107 26.63% 0.87% 180 17 3.04 111000 **Crop Production** 1,451 12.44% 0.41% 102 14 0.76 4 311920 Coffee and Tea Manufacturing 1,315 11.27% 0.37% 329 31.11 311511 Fluid Milk Manufacturing 833 7.14% 11 76 6.68 0.23% Ice Cream and Frozen Dessert 311520 614 5.26% 0.17% 5 123 12.60 Manufacturing 311812 435 3.73% 0.12% 27 16 1.41 **Commercial Bakeries** 311811 **Retail Bakeries** 403 3.45% 0.11% 26 16 2.07 Farm Labor Contractors and Crew 115115 390 3.34% 0.11% 2 195 0.56 Leaders 311119 Other Animal Food Manufacturing 363 3.11% 0.10% 16 23 4.93 Confectionery Manufacturing from 337 2.89% 12 4.66 311330 0.09% 28 **Purchased Chocolate** 311513 Cheese Manufacturing 305 2.61% 0.09% 16 19 3.07 312120 **Breweries** 293 2.51% 0.08% 12 24 4.00 Farm and Garden Machinery and 423820 242 2.07% 0.07% 33 7 0.99 **Equipment Merchant Wholesalers**

³² Note that this figure differs from the Farm-to-Plate estimate because of the industries included in the cluster definition. Also, EMSI on employment data is used throughout this CEDS Targeted Cluster Analysis to allow for consistency across sectors. The Farm-to-Plate Study uses different data sources for the Cluster as a whole and for sub-sectors. Therefore this Targeted Cluster Analysis may underestimate growth in the Cluster overall and some sub-sectors within the cluster.

424910	Farm Supplies Merchant Wholesalers	200	1.71%	0.06%	29	7	0.75
115112	Soil Preparation, Planting, and Cultivating	158	1.35%	0.04%	9	18	2.07
312130	Wineries	156	1.34%	0.04%	11	14	1.33
311813	Frozen Cakes, Pies, and Other Pastries Manufacturing	138	1.18%	0.04%	1	138	5.11
311612	Meat Processed from Carcasses	111	0.95%	0.03%	7	16	0.42
311999	All Other Miscellaneous Food Manufacturing	106	0.91%	0.03%	5	21	1.62
333294	Food Product Machinery Manufacturing	102	0.87%	0.03%	2	51	2.49
311514	Dry, Condensed, and Evaporated Dairy Product Manufacturing	81	0.69%	0.02%	1	81	2.30
311821	Cookie and Cracker Manufacturing	77	0.66%	0.02%	8	10	0.97
311611	Animal (except Poultry) Slaughtering	75	0.64%	0.02%	5	15	0.22
311412	Frozen Specialty Food Manufacturing	48	0.41%	0.01%	2	24	0.36
311421	Fruit and Vegetable Canning	42	0.36%	0.01%	6	7	0.29
311991	Perishable Prepared Food Manufacturing	36	0.31%	0.01%	6	6	0.42
312113	Ice Manufacturing	35	0.30%	0.01%	1	35	2.05
325314	Fertilizer (Mixing Only) Manufacturing	32	0.27%	0.01%	4	8	1.61
424520	Livestock Merchant Wholesalers	26	0.22%	0.01%	5	5	0.58
424510	Grain and Field Bean Merchant Wholesalers	24	0.21%	0.01%	2	12	0.21
311111	Dog and Cat Food Manufacturing	21	0.18%	0.01%	5	4	0.41
311340	Nonchocolate Confectionery Manufacturing	18	0.15%	0.01%	5	4	0.43
115113	Crop Harvesting, Primarily by Machine	17	0.15%	0.00%	3	6	0.59
312140	Distilleries	14	0.12%	0.00%	4	4	0.72
115116	Farm Management Services	12	0.10%	0.00%	3	4	0.25
311919	Other Snack Food Manufacturing	12	0.10%	0.00%	4	3	0.15
Food Pro Processi	oduction and Value Added ng Total	11,666	100.00%	3.27%	587	20	

Note: Industries with fewer than 10 employees not included

Industry Data

Historic 2008-2013

	Food Production and Value Added Processing Cluster - Historic Growth							
NAICS	Description	2008 Jobs	2013 Jobs	# Change	% Change			
311920	Coffee and Tea Manufacturing	385	1,315	930	242%			
311511	Fluid Milk Manufacturing	633	833	200	32%			
311520	Ice Cream and Frozen Dessert Manufacturing	453	614	161	36%			
311119	Other Animal Food Manufacturing	251	363	112	45%			

				-	
311821 311111	Cookie and Cracker Manufacturing Dog and Cat Food Manufacturing	60 11	77 21	17 10	28% 91%
312140	Distilleries	<10	14	9	180%
115116	Farm Management Services	<10	12	7	140%
325314	Fertilizer (Mixing Only) Manufacturing	25	32	7	28%
424510	Grain and Field Bean Merchant Wholesalers	18	24	6	33%
115113		12	17	5	42%
	Crop Harvesting, Primarily by Machine				
311991	Perishable Prepared Food Manufacturing	34	36	2	6%
311340	Nonchocolate Confectionery Manufacturing	23	18	(5)	-22%
312113	Ice Manufacturing	45	35	(10)	-22%
424520	Livestock Merchant Wholesalers	40	26	(14)	-35%
311941	Mayonnaise, Dressing, and Other Prepared Sauce Manufacturing	25	<10	(20)	-80%
312112	Bottled Water Manufacturing	28	<10	(23)	-82%
424590	Other Farm Product Raw Material Merchant Wholesalers	30	<10	(25)	-83%
311919	Other Snack Food Manufacturing	38	12	(26)	-68%
311421	Fruit and Vegetable Canning	72	42	(30)	-42%
311330	Confectionery Manufacturing from Purchased Chocolate	373	337	(36)	-10%
423820	Farm and Garden Machinery and Equipment Merchant Wholesalers	279	242	(37)	-13%
424910	Farm Supplies Merchant Wholesalers	239	200	(39)	-16%
112000	Animal Production	3,150	3,107	(43)	-1%
311513	Cheese Manufacturing	377	305	(72)	-19%
311412	Frozen Specialty Food Manufacturing	165	48	(117)	-71%
	Dry, Condensed, and Evaporated Dairy Product			` '	
311514	Manufacturing	235	81	(154)	-66%
Food Pro	duction and Value Added Processing Total	10,072	11,666	1,594	16%

Source: QCEW Employees, Non-QCEW Employees & Self-Employed - EMSI 2013.4 Class of Worker Note: Industries with fewer than 10 employees in 2008 and 2013 not included. For industries with fewer than 10 employees in only one year, analyst assumes 5 employees for purposes of calculation.

NAICS		Food Production and Value Added Processing	Cluster - F	rojected <u>G</u>	rowth	
Solit Soli	NAICE					%
115112 Soil Preparation, Planting, and Cultivating 158 232 74 47% 312120 Breweries 293 346 53 18% 312130 Wineries 156 207 51 33% 111000 Crop Production 1,451 1,496 45 3% 311811 Retail Bakeries 403 446 43 11% 311812 Meat Processed from Carcasses 111 141 30 27% 311812 Commercial Bakeries 435 464 29 7% 311812 Cockie and Cracker Manufacturing 75 95 20 27% 311520 Ice Cream and Frozen Dessert	NAICS	Description	Jobs	Jobs	Change	Change
312120 Breweries 293 346 53 18% 312130 Wineries 156 207 51 33% 311110 Crop Production 1,451 1,496 45 33% 311811 Retail Bakeries 403 446 43 11% 311999 All Other Miscellaneous Food Manufacturing 106 141 35 33% 311612 Meat Processed from Carcasses 111 141 30 27% 311812 Commercial Bakeries 435 464 29 7% 333294 Food Product Machinery Manufacturing 363 386 23 6% 311811 Other Animal Food Manufacturing 363 386 23 6% 311811 Other Animal Food Manufacturing 77 97 20 26% 311821 Cookie and Cracker Manufacturing 77 97 20 26% 311821 Cookie and Cracker Manufacturing 614 632 18 3% 115115 Farm Labor Contractors and Crew Leaders 390 406 16 4% 423820 Farm and Garden Machinery and Equipment 242 257 15 6% 312113 Ice Manufacturing 35 48 13 37% 311813 Crop Harvesting, Primarily by Machine 17 29 12 71% 311813 Frozen Cakes, Pies, and Other Pastries 138 149 11 8% 424510 Grain and Field Bean Merchant Wholesalers 24 33 9 38% 315111 Dog and Cat Food Manufacturing 32 35 3 9% 424510 Grain and Field Bean Merchant Wholesalers 24 33 9 38% 311919 Other Snack Food Manufacturing 32 35 3 9% 115116 Farm Management Services 12 13 1 8% 311919 Other Snack Food Manufacturing 36 29 77 -19% 311919 Other Snack Food Manufacturing 37 302 35 -10% 311911 Crop Harvesting Frozen Confectionery Manufacturing 37 39 305 -4% 311412 Frit and Vegetable Canning 42 -10 -38% 311412 Frit and Vegetable Canning 42 -10 -38% 311414 Frit and Vegetable Canning 48 -10 -49% 311421 Frozen Specialty Food Manufacturing 305 -25% 311514 Dry, Condensed, and Evaporated Dairy Product 81 -10 -66% 311514 Crop Animal Production 3,107 2,887 (220) -7%	311920	Coffee and Tea Manufacturing	1,315	1,974	659	50%
312130 Wineries 156 207 51 33% 111000 Crop Production 1,451 1,496 45 3% 311811 Retail Bakeries 403 446 43 111% 311999 All Other Miscellaneous Food Manufacturing 106 141 35 33% 33% 311612 Meat Processed from Carcasses 111 141 30 27% 311812 Commercial Bakeries 435 464 29 7% 311812 Commercial Bakeries 435 464 29 7% 311812 Commercial Bakeries 435 464 29 7% 311812 Conduct Machinery Manufacturing 102 130 28 27% 31119 Other Animal Food Manufacturing 363 386 23 6% 311611 Animal (except Poultry) Slaughtering 75 95 20 27% 27% 311821 Cookie and Cracker Manufacturing 77 77 20 26% 311821 Cookie and Cracker Manufacturing 77 77 20 26% 311520 Ice Cream and Frozen Dessert Manufacturing 614 632 18 3% 3% 115115 Farm Labor Contractors and Crew Leaders 390 406 16 4% 44%	115112	Soil Preparation, Planting, and Cultivating	158	232	74	47%
111000 Crop Production 1,451 1,496 45 3% 311811 Retail Bakeries 403 446 43 11% 311999 All Other Miscellaneous Food Manufacturing 106 141 35 33% 311812 Meat Processed from Carcasses 111 141 30 27% 311812 Commercial Bakeries 435 464 29 7% 33294 Food Product Machinery Manufacturing 102 130 28 27% 311119 Other Animal Food Manufacturing 363 386 23 6% 311119 Animal (except Poultry) Slaughtering 75 95 20 27% 311821 Cookie and Cracker Manufacturing 77 97 20 26% 311515 Farm Labor Contractors and Crew Leaders 390 406 16 4% 423820 Farm and Garden Machinery and Equipment Merchant Wholesalers 242 257 15 6% 312113 Ice Manufacturing 35 48	312120	Breweries	293	346	53	18%
311811 Retail Bakeries	312130	Wineries	156	207	51	33%
311999 All Other Miscellaneous Food Manufacturing 106	111000	Crop Production	1,451	1,496	45	3%
311612 Meat Processed from Carcasses 111	311811	Retail Bakeries	403	446	43	11%
311812 Commercial Bakeries 435 464 29 7% 333294 Food Product Machinery Manufacturing 102 130 28 27% 311119 Other Animal Food Manufacturing 363 386 23 6% 311611 Animal (except Poultry) Slaughtering 75 95 20 27% 311821 Cookie and Cracker Manufacturing 77 97 20 26% 311520 Ice Cream and Frozen Dessert Manufacturing 614 632 18 3% 115115 Farm Labor Contractors and Crew Leaders 390 406 16 4% 423820 Farm and Garden Machinery and Equipment Merchant Wholesalers 395 406 16 4% 423820 Farm and Garden Machinery and Equipment Merchant Wholesalers 35 48 13 37% 312113 Ice Manufacturing 35 48 13 37% 311813 Frozen Cakes, Pies, and Other Pastries Manufacturing 318 149 11 8% 424510 Grain and Field Bean Merchant Wholesalers 24 33 9 38% 311111 Dog and Cat Food Manufacturing 21 28 7 33% 325314 Fertilizer (Mixing Only) Manufacturing 32 35 3 9% 311340 Nonchocolate Confectionery Manufacturing 31 31 31 8% 311919 Other Snack Food Manufacturing 31 31 31 31 31 31 31 3	311999	All Other Miscellaneous Food Manufacturing	106	141	35	33%
333294 Food Product Machinery Manufacturing 102 130 28 27% 311119 Other Animal Food Manufacturing 363 386 23 6% 311611 Animal (except Poultry) Slaughtering 75 95 20 27% 311821 Cookie and Cracker Manufacturing 77 97 20 26% 311520 Ice Cream and Frozen Dessert Manufacturing 614 632 18 3% 115115 Farm Labor Contractors and Crew Leaders 390 406 16 4% 423820 Farm and Garden Machinery and Equipment Merchant Wholesalers 35 48 13 37% 311813 Ice Manufacturing 35 48 13 37% 311813 Frozen Cakes, Pies, and Other Pastries Manufacturing 318 149 11 8% 424510 Grain and Field Bean Merchant Wholesalers 24 33 9 38% 311111 Dog and Cat Food Manufacturing 21 28 7 33% 325314 Fertilizer (Mixing Only) Manufacturing 32 35 3 9% 15116 Farm Management Services 12 13 1 8% 311340 Nonchocolate Confectionery Manufacturing 12 410 (7) 58% 311919 Other Snack Food Manufacturing 12 410 (7) 58% 311919 Perishable Prepared Food Manufacturing 36 29 (7) 19% 312140 Distilleries 14 410 (9) 64% 424520 Livestock Merchant Wholesalers 26 16 (10) -38% 311330 Confectionery Manufacturing 833 798 (35) 4% 424510 Furit and Vegetable Canning 42 410 (37) -88% 311412 Frozen Specialty Food Manufacturing 48 410 (43) -90% 311513 Cheese Manufacturing 305 258 (47) -15% 424910 Farm Supplies Merchant Wholesalers 200 150 (50) -25% 311514 Dry, Condensed, and Evaporated Dairy Product 81 410 (76) -94% 112000 Animal Production 3,107 2,887 (220) -7% 112000 Animal Production 3,107 2,887 (220	311612	Meat Processed from Carcasses	111	141	30	27%
311119	311812	Commercial Bakeries	435	464	29	7%
311611	333294	Food Product Machinery Manufacturing	102	130	28	27%
311821 Cookie and Cracker Manufacturing 77 97 20 26% 311520 Ice Cream and Frozen Dessert Manufacturing 614 632 18 3% 115115 Farm Labor Contractors and Crew Leaders 390 406 16 4% 423820 Farm and Garden Machinery and Equipment Merchant Wholesalers 35 48 13 37% 312113 Ice Manufacturing 35 48 13 37% 312113 Ice Manufacturing 35 48 13 37% 311813 Frozen Cakes, Pies, and Other Pastries Manufacturing 318 149 11 8% 311813 Frozen Cakes, Pies, and Other Pastries Manufacturing 21 28 7 33% 325314 Fertilizer (Mixing Only) Manufacturing 21 28 7 33% 325314 Fertilizer (Mixing Only) Manufacturing 32 35 3 9% 311340 Nonchocolate Confectionery Manufacturing 32 35 3 9% 311919 Other Snack Food Manufacturing 36 29 (7) -58% 311991 Perishable Prepared Food Manufacturing 36 29 (7) -19% 312140 Distilleries 14 <10 (9) -64% 424520 Livestock Merchant Wholesalers 26 16 (10) -38% 311330 Confectionery Manufacturing 383 798 (35) -4% 311421 Fruit and Vegetable Canning 42 <10 (37) -88% 311412 Frozen Specialty Food Manufacturing 305 258 (47) -15% 424910 Farm Supplies Merchant Wholesalers 200 150 (50) -25% 311514 Dry, Condensed, and Evaporated Dairy Product Manufacturing 3107 2,887 (220) -7%	311119	Other Animal Food Manufacturing	363	386	23	6%
11520 Ice Cream and Frozen Dessert Manufacturing 614 632 18 3% 115115 Farm Labor Contractors and Crew Leaders 390 406 16 4% 423820 Farm and Garden Machinery and Equipment Merchant Wholesalers 242 257 15 6% 6% 1513 1514 6% 1514	311611	Animal (except Poultry) Slaughtering	75	95	20	27%
115115 Farm Labor Contractors and Crew Leaders 390 406 16 4% 423820 Farm and Garden Machinery and Equipment Merchant Wholesalers 242 257 15 6% 312113 Ice Manufacturing 35 48 13 37% 115113 Crop Harvesting, Primarily by Machine 17 29 12 71% 311813 Frozen Cakes, Pies, and Other Pastries Manufacturing 138 149 11 8% 424510 Grain and Field Bean Merchant Wholesalers 24 33 9 38% 311111 Dog and Cat Food Manufacturing 21 28 7 33% 325314 Fertilizer (Mixing Only) Manufacturing 32 35 3 9% 115116 Farm Management Services 12 13 1 8% 311340 Nonchocolate Confectionery Manufacturing 18 17 (1) -6% 311991 Perishable Prepared Food Manufacturing 12 <10	311821	Cookie and Cracker Manufacturing	77	97	20	26%
423820 Farm and Garden Machinery and Equipment Merchant Wholesalers 242 257 15 6% 312113 Ice Manufacturing 35 48 13 37% 115113 Crop Harvesting, Primarily by Machine 17 29 12 71% 311813 Frozen Cakes, Pies, and Other Pastries Manufacturing 138 149 11 8% 424510 Grain and Field Bean Merchant Wholesalers 24 33 9 38% 311111 Dog and Cat Food Manufacturing 21 28 7 33% 325314 Fertilizer (Mixing Only) Manufacturing 32 35 3 9% 115116 Farm Management Services 12 13 1 8% 311340 Nonchocolate Confectionery Manufacturing 18 17 (1) -6% 311991 Perishable Prepared Food Manufacturing 12 <10	311520	Ice Cream and Frozen Dessert Manufacturing	614	632	18	3%
Merchant Wholesalers Merchant Wholesalers	115115	Farm Labor Contractors and Crew Leaders	390	406	16	4%
115113 Crop Harvesting, Primarily by Machine 17 29 12 71% 311813 Frozen Cakes, Pies, and Other Pastries Manufacturing 138 149 11 8% 424510 Grain and Field Bean Merchant Wholesalers 24 33 9 38% 311111 Dog and Cat Food Manufacturing 21 28 7 33% 325314 Fertilizer (Mixing Only) Manufacturing 32 35 3 9% 115116 Farm Management Services 12 13 1 8% 311340 Nonchocolate Confectionery Manufacturing 18 17 (1) -6% 311991 Perishable Prepared Food Manufacturing 36 29 (7) -19% 311991 Perishable Prepared Food Manufacturing 36 29 (7) -19% 311901 Distilleries 14 <10	423820	· · ·	242	257	15	6%
311813 Frozen Cakes, Pies, and Other Pastries Manufacturing 138 149 11 8% 424510 Grain and Field Bean Merchant Wholesalers 24 33 9 38% 311111 Dog and Cat Food Manufacturing 21 28 7 33% 325314 Fertilizer (Mixing Only) Manufacturing 32 35 3 9% 115116 Farm Management Services 12 13 1 8% 311340 Nonchocolate Confectionery Manufacturing 18 17 (1) -6% 311991 Other Snack Food Manufacturing 12 <10	312113	Ice Manufacturing	35	48	13	37%
Manufacturing 136 149 11 8% 424510 Grain and Field Bean Merchant Wholesalers 24 33 9 38% 311111 Dog and Cat Food Manufacturing 21 28 7 33% 325314 Fertilizer (Mixing Only) Manufacturing 32 35 3 9% 115116 Farm Management Services 12 13 1 8% 311340 Nonchocolate Confectionery Manufacturing 18 17 (1) -6% 311919 Other Snack Food Manufacturing 12 <10	115113	Crop Harvesting, Primarily by Machine	17	29	12	71%
311111 Dog and Cat Food Manufacturing 21 28 7 33% 325314 Fertilizer (Mixing Only) Manufacturing 32 35 3 9% 115116 Farm Management Services 12 13 1 8% 311340 Nonchocolate Confectionery Manufacturing 18 17 (1) -6% 311919 Other Snack Food Manufacturing 12 <10	311813		138	149	11	8%
325314 Fertilizer (Mixing Only) Manufacturing 32 35 3 9% 115116 Farm Management Services 12 13 1 8% 311340 Nonchocolate Confectionery Manufacturing 18 17 (1) -6% 311919 Other Snack Food Manufacturing 12 <10	424510	Grain and Field Bean Merchant Wholesalers	24	33	9	38%
115116 Farm Management Services 12 13 1 8% 311340 Nonchocolate Confectionery Manufacturing 18 17 (1) -6% 311919 Other Snack Food Manufacturing 12 <10	311111	Dog and Cat Food Manufacturing	21	28	7	33%
311340 Nonchocolate Confectionery Manufacturing 18 17 (1) -6% 311919 Other Snack Food Manufacturing 12 <10	325314	Fertilizer (Mixing Only) Manufacturing	32	35	3	9%
311919 Other Snack Food Manufacturing 12 <10	115116	Farm Management Services	12	13	1	8%
311991 Perishable Prepared Food Manufacturing 36 29 (7) -19% 312140 Distilleries 14 <10	311340	Nonchocolate Confectionery Manufacturing	18	17	(1)	-6%
312140 Distilleries 14 <10	311919	Other Snack Food Manufacturing	12	<10	(7)	-58%
424520 Livestock Merchant Wholesalers 26 16 (10) -38% 311330 Confectionery Manufacturing from Purchased Chocolate 337 302 (35) -10% 311511 Fluid Milk Manufacturing 833 798 (35) -4% 311421 Fruit and Vegetable Canning 42 <10	311991	Perishable Prepared Food Manufacturing	36	29	(7)	-19%
311330 Confectionery Manufacturing from Purchased Chocolate 337 302 (35) -10% 311511 Fluid Milk Manufacturing 833 798 (35) -4% 311421 Fruit and Vegetable Canning 42 <10	312140	Distilleries	14	<10	(9)	-64%
311330 Chocolate 337 302 (35) -10% 311511 Fluid Milk Manufacturing 833 798 (35) -4% 311421 Fruit and Vegetable Canning 42 <10	424520	Livestock Merchant Wholesalers	26	16	(10)	-38%
311421 Fruit and Vegetable Canning 42 <10	311330	•	337	302	(35)	-10%
311412 Frozen Specialty Food Manufacturing 48 <10	311511	Fluid Milk Manufacturing	833	798	(35)	-4%
311513 Cheese Manufacturing 305 258 (47) -15% 424910 Farm Supplies Merchant Wholesalers 200 150 (50) -25% 311514 Dry, Condensed, and Evaporated Dairy Product Manufacturing 81 <10	311421	Fruit and Vegetable Canning	42	<10	(37)	-88%
424910 Farm Supplies Merchant Wholesalers 200 150 (50) -25% 311514 Dry, Condensed, and Evaporated Dairy Product Manufacturing 81 <10	311412	Frozen Specialty Food Manufacturing	48	<10	(43)	-90%
Dry, Condensed, and Evaporated Dairy Product Manufacturing Animal Production Manufacturing 3,107 2,887 (220) -7%	311513	Cheese Manufacturing	305	258	(47)	-15%
Manufacturing 81 <10 (76) -94% 112000 Animal Production 3,107 2,887 (220) -7%	424910	Farm Supplies Merchant Wholesalers	200	150	(50)	-25%
	311514		81	<10	(76)	-94%
	112000	Animal Production	3,107	2,887	(220)	-7%
	Food Pro	duction and Value Added Processing Total	11,666			5%

Source: QCEW Employees, Non-QCEW Employees & Self-Employed - EMSI 2013.4 Class of Worker Note: Industries with fewer than 10 employees in 2013 and 2023 not included. For industries with fewer than 10 employees in only one year, analyst assumes 5 employees for purposes of calculation.

Occupation Data

Food Production and Value Added Processing Cluster - Occupation Analysis (20 largest)							
SOC	Occupation	2013 Jobs	Annual Wages	Education Required			
11-9013	Farmers, Ranchers, and Other Agricultural Managers	2,417	\$33,240	Work experience in a related occupation			
45-2092	Farmworkers and Laborers, Crop, Nursery, and Greenhouse	1,432	\$23,180	Short-term on-the-job training			
51-9111	Packaging and Filling Machine Operators and Tenders	999	\$27,440	Moderate-term on-the-job training			
51-3092	Food Batchmakers	389	\$25,960	Short-term on-the-job training			
51-3011	Bakers	326	\$22,780	Long-term on-the-job training			
53-3032	Heavy and Tractor-Trailer Truck Drivers	266	\$34,820	Short-term on-the-job training			
51-9012	Separating, Filtering, Clarifying, Precipitating, and Still Machine Setters, Operators, and Tenders	260	\$33,920	Moderate-term on-the-job training			
51-1011	First-Line Supervisors of Production and Operating Workers	211	\$51,580	Work experience in a related occupation			
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	192	\$49,740	Moderate-term on-the-job training			
53-3031	Driver/Sales Workers	173	\$21,720	Short-term on-the-job training			
53-7064	Packers and Packagers, Hand	161	\$21,440	Short-term on-the-job training			
45-2041	Graders and Sorters, Agricultural Products	158	\$19,200	Short-term on-the-job training			
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	157	\$24,960	Short-term on-the-job training			
45-2093	Farmworkers, Farm, Ranch, and Aquacultural Animals	153	\$21,220	Short-term on-the-job training			
43-3031	Bookkeeping, Accounting, and Auditing Clerks	142	\$33,200	Moderate-term on-the-job training			
49-9071	Maintenance and Repair Workers, General	141	\$33,840	Moderate-term on-the-job training			
45-2091	Agricultural Equipment Operators	132	\$20,080	Short-term on-the-job training			
51-3099	Food Processing Workers, All Other	131	\$21,240	Moderate-term on-the-job training			
51-3091	Food and Tobacco Roasting, Baking, and Drying Machine Operators and Tenders	110	\$22,800	Moderate-term on-the-job training			
53-7051	Industrial Truck and Tractor Operators	108	\$29,820	Short-term on-the-job training			

Source: QCEW Employees, Non-QCEW Employees & Self-Employed - EMSI 2013.4 Class of Worker

Note: Annual wages based on 2,000 hours per year

Historic 2008-2013

Food Production and Value Added Processing Cluster - Historic Occupation Growth (Top 20 Largest Growth)						
SOC	Occupation	2008 Jobs	2013 Jobs	# Change	% Change	
Total	All Cluster Occupations	9,671	11,181	1,452	15%	
51-9111	Packaging and Filling Machine Operators and Tenders	738	999	261	35%	
45-2092	Farmworkers and Laborers, Crop, Nursery, and Greenhouse	1,260	1,432	172	14%	
51-3092	Food Batchmakers	315	389	74	23%	
51-3011	Bakers	252	326	74	29%	
45-2041	Graders and Sorters, Agricultural Products	95	158	63	66%	
51-9012	Separating, Filtering, Clarifying, Precipitating, and Still Machine Setters, Operators, and Tenders	201	260	59	29%	
53-3032	Heavy and Tractor-Trailer Truck Drivers	212	266	54	25%	
51-1011	First-Line Supervisors of Production and Operating Workers	159	211	52	33%	
51-3091	Food and Tobacco Roasting, Baking, and Drying Machine Operators and Tenders	72	110	38	53%	
53-3031	Driver/Sales Workers	136	173	37	27%	
51-9199	Production Workers, All Other	65	98	33	51%	
51-3099	Food Processing Workers, All Other	99	131	32	32%	
41-1011	First-Line Supervisors of Retail Sales Workers	35	61	26	74%	
53-7064	Packers and Packagers, Hand	136	161	25	18%	
49-9071	Maintenance and Repair Workers, General	116	141	25	22%	
49-9041	Industrial Machinery Mechanics	81	106	25	31%	
43-3031	Bookkeeping, Accounting, and Auditing Clerks	118	142	24	20%	
51-2092	Team Assemblers	77	100	23	30%	
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	67	87	20	30%	
39-2021	Nonfarm Animal Caretakers	54	74	20	37%	

Source: QCEW Employees, Non-QCEW Employees & Self-Employed - EMSI 2013.4 Class of

Worker

Projected 2013-2023

Food Pro	Food Production and Value Added Processing Cluster - Projected Occupation Growth (Top 20 Largest Growth)						
SOC	Occupation	2013 Jobs	2023 Jobs	# Change	% Change		
Total	All Cluster Occupations	11,181	11,763	582	5%		
45-2092	Farmworkers and Laborers, Crop, Nursery, and Greenhouse	1,432	1,553	121	8%		
51-9111	Packaging and Filling Machine Operators and Tenders	999	1,059	60	6%		
51-3011	Bakers	326	372	46	14%		
53-7064	Packers and Packagers, Hand	161	200	39	24%		

51-3092	Food Batchmakers	389	421	32	8%
49-9041	Industrial Machinery Mechanics	106	136	30	28%
51-9199	Production Workers, All Other	98	123	25	26%
39-2021	Nonfarm Animal Caretakers	74	97	23	31%
51-9012	Separating, Filtering, Clarifying, Precipitating, and Still Machine Setters, Operators, and Tenders	260	282	22	8%
51-1011	First-Line Supervisors of Production and Operating Workers	211	232	21	10%
53-7051	Industrial Truck and Tractor Operators	108	129	21	19%
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	157	177	20	13%
53-3032	Heavy and Tractor-Trailer Truck Drivers	266	284	18	7%
39-2011	Animal Trainers	81	98	17	21%
51-2092	Team Assemblers	100	116	16	16%
45-2041	Graders and Sorters, Agricultural Products	158	172	14	9%
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	87	101	14	16%
51-9023	Mixing and Blending Machine Setters, Operators, and Tenders	60	74	14	23%
51-3091	Food and Tobacco Roasting, Baking, and Drying Machine Operators and Tenders	110	123	13	12%
41-1011	First-Line Supervisors of Retail Sales Workers	61	74	13	21%

Worker

Market Research

The Food Production and Value Added Processing Cluster has seen growth over the last 5 years and is projected to continue to grow in terms of the number of employees. Similar to the Forestry and Wood Products Industry, this cluster has a particularly important role for Vermont in that agriculture is part of the history of the State and residents are proud of that history. In addition, many residents are committed to purchasing local/state produced goods and find value in paying for products produced locally. Also, similar to the Forestry and Wood Products Cluster, the "Made in Vermont" seal holds weight for people out of state who associate that label with "high quality", which therefore increases the price they are willing to pay.

Typically, access to raw materials and customers is equally important to food manufacturing firms, but some site selectors are noting that there has been a shift recently where access to raw materials has become more important and proximity to regional markets has become less important in the food manufacturing supply chain. This trend of locating closer to the raw materials can be seen particularly in larger establishments with a national market, which are more likely to locate near their raw materials. Smaller establishments that have a more local or regional market still find it important to locate near their customers and build that relationship of "being local".³³

The skills required for farming and food production are continually changing and requiring more and more technical expertise. It can be difficult for owners to find employees that have the skills and desire to work in the agriculture and food production industry. The State offers academic programs for

³³ U.S. Food Processing Subsector Structure and Trends. Expansion Solutions Magazine. http://expansionsolutionsmagazine.com/010_foodprocessing

students of agriculture to help them create new businesses and provide the necessary workforce to support agriculture and food production industries. For example, the Vermont Technical College in Randolph offers a two-year academic program known as Agribusiness Management Technology which teaches students who are interested in pursuing careers that serve the agriculture industry. Students who graduate from this program may then apply to the Farm and Agricultural Resource Management Stewards (F.A.R.M.S.) program offered with UVM. These programs focus the basics of animal and plant management and also provide business and communication skills training to help those starting a new operation or diversifying into new areas of focus to be successful.³⁴

The Vermont Higher Education Food System Consortium is an exciting new venture being undertaken through a collaboration of six educational institutions including: Green Mountain College, Sterling College, University of Vermont, Vermont Law School and Vermont Technical College. This partnership will allow the organizations to pool resources, share faculty, internships, and courses to attract students from across the country to Vermont and create recognition as an epicenter for local food-systems.

The following information is pulled from the most recent Census of Agriculture conducted by the United States Department of Agriculture. The 2007 Census of Agriculture includes information on a wide variety of topics related to agriculture in the United States and breaks down some important indicators to the County and State level. Some of the establishment and employment information in this section is different than presented above due to different reporting requirements between the agencies that make up the source data, difference in categorization by the agencies, and due to fact that the above data is also focused on the cluster as a whole and includes non-farm based employment.

The table below highlights some farming related indicators including total number of farms, amount of harvested croplands and other statistics between 1997 and 2007. The number of farms decreased between 1997 and 2002 but has increased slightly since 2002. The average size of farms, in acres, has decreased since 1997 to 177 acres, while total farm production expenses have increased.

2007 Agriculture Census									
	1997		2002		2007				
Total Farms	7,063		6,571		6,984				
Total Harvested Cropland (acres)	632,339		567,509		516,624				
Average Size of Farms (acres)	186		189		177				
Average Age of Principal Operator (years)	52.70		53.90		56.50				
Total Farm Production Expenses	\$ 390,196	\$	427,717	\$	549,904				
Net Cash Farm Income of the Operations	NA	\$	101,678,000	\$	159,346,000				
Average per farm	NA	\$	15,462	\$	22,816				

Source: 2007 Census of Agriculture, USDA Table 1- Historical Highlights, USDA Table 4 - Net Cash Farm Income of Operations and Operators

The second table shows the total number of farms as reported by the USDA, total hired help (does not include the farm owners), and the breakdown of the number of workers on the farm. Nearly 75% of all farms have fewer than 4 workers.

³⁴Agribusiness Management Technology website. http://www.vtc.edu/interior.php/pid/4/sid/26/tid/549 Target Sector & Cluster Analysis – Appendix D

2007 Agriculture Census								
	Farms % of Farms Workers % of W							
Number	1,884	100%	8,434	100%				
Farms with 1 Worker	585	31%	585	7%				
Farms with 2 Workers	368	20%	732	9%				
Farms with 3 or 4 Workers	413	22%	1,422	17%				
Farms with 5 to 9 Workers	355	19%	2,295	27%				
Farm with 10 or More Workers	185	10%	3,329	39%				

Source: 2007 Census of Agriculture, USDA Table 7- Hired Farm Labor

Finally, the following table shows the breakdown of the farm outputs by product.

Farm Outputs						
Good	Farms	Number/Acres				
Beef Cows (number)	1,048	10,002				
Milk Cows (number)	1,219	139,719				
Corn for Grain (acres)	71	5,368				
Corn for Silage or Greenchop (acres)	674	87,403				
Wheat for Grain, all (acres)	9	379				
Oats for Grain (acres)	12	211				
Soybeans for Geans (acres)	21	2,011				
Vegetables Harvested for Sale (acres)	494	3,927				
Land in Orchards (acres)	310	3,547				

Source: 2007 Census of Agriculture, USDA

Examples of companies operating under this cluster include Rhino Foods, Agri-Mark, Maple Grove Farms of Vermont, The Grafton Village Cheese Company, Long Trail Brewing Company, Pepsi-Cola Bottling, Neshobe River Whisky, Honora Winery & Vineyard, Sentinel Pine Orchards, Green Mountain Orchards, Thomas Dairy, and Mountain Mozzarella.

Insights from Previous Reports

The following is an overview of information from a review of previous reports as they relate to the Food Production and Value Added Processing Cluster in Vermont.

Farm to Plate Strategic Plan

The agriculture industry, related food production industries, and sustainable food movement are all very important to the State of Vermont in terms of the economy, state values, perception, and community spirit. The Farm to Plate strategic plan and associated website and networks highlight the amount of work being attempted and accomplished to support the food industry and all of its various pathways, companies, establishments and organizations. The Plan notes that the "food" industry in Vermont can provide strengthened local economies, maintain the working landscapes, and protect the natural resources of the State.

The Farm to Plate Strategic Plan highlights 25 goals, including:

- Increase consumption of Vermont-produced foods by Vermonters and regional consumers, including in institutional settings
- Identify ways to reduce the cost of farm inputs for farmers including creating options for farmers to reduce their production expenses and making agricultural lands and soils available and affordable for future generations.

- Increasing local food production for all types of markets, including Vermont's dairy industry, and
 making the majority of farms profitable with Vermonters having a better understanding of how
 to obtain and prepare nutritional food.
- Expand Vermont's food processing and manufacturing capacity to meet the needs of a growing food system.
- Create a sufficient supply of all scales and types of on-farm commercial storage, aggregation, telecommunications, and distribution services to meet the needs of increasing year-round food production and consumer demand.
- Make local food available at all Vermont market outlets.
- Divert organic materials from farms away from landfills to be used to produce compost, fertilizer, animal feed, feedstock for anaerobic digesters, and other agricultural products.
- Provide all Vermonters with access to fresh, nutritionally balanced food that they can afford.
- Offer a wide range of curricula, certificate, degree programs at Vermont K-12 schools, Career and Technical Education Centers and institutions of higher learning. Conduct research aimed at meeting the needs of Vermont's food system.
- Increase the number of locally owned and operated food system businesses. These establishments should provide safe and welcoming working conditions, livable wages, and have access to a skilled and reliable workforce.
- Provide business planning and technical assistance to Vermont's food system businesses that is coordinated, strategic and accessible.
- Provide food system entrepreneurs with access to capital to meet their needs and work with private foundations, state, and federal funding sources to coordinate and leverage available resources.
- Minimize the use of fossil fuels and maximize use of renewable energy by food system enterprises.
- Ensure regulations and enforcement capacity meet food safety requirements, be scale appropriate, and enable Vermont food system enterprises to succeed in all markets.
- All levels of government should support and celebrate Vermont's food system and champion it as an economic development driver.

Forestry and Wood Products Cluster

Cluster Description

The Forestry and Wood Products Cluster, including both primary and secondary product manufacturing, has been a historically important cluster for the State. The annual contribution of forest-based manufacturing and forest-related recreation and tourism is over \$1.5 billion to the Vermont economy.35The resources of the northern forest and throughout New England have created a cluster of industry operations (production, logging, and paper mill) that have employed residents for generations.

The forest and wood products industry consists of companies engaged in operating timber tracts, nurseries, seeding, reforestation, and harvesting timber and other forest products. The industry also includes related services, such as cutting, logging, transporting, estimating and other forest management services. Products manufactured include lumber, plywood, flake board, chips, sawdust, wood flooring, shingles, tiles, millwork, laminated veneer, fencing and other primary wood products.³⁶ Also included in this industry are paper and pulp manufacturers and other pulp related product manufacturing such as cardboard.

There are three subsectors of the Forestry and Wood Products Cluster including: 1) furniture and interior renovation product manufacturing, 2) pallets and plywood production, and 3) pulp and paper product manufacturing. There has been a decrease in jobs in these subsectors due to increased automation. However, the increase in automation requires that the employees have more technical skills and they can therefore demand higher wages.

The following table contains a list of the industries included in this analysis of the Forestry and Wood Products Cluster.

	Forestry and Wood Products Cluster				
NAICS Code	Description				
113110	Timber Tract Operations				
113210	Forest Nurseries and Gathering of Forest Products				
113310	Logging				
115310	Support Activities for Forestry				
238130	Framing Contractors				
238160	Roofing Contractors				
238170	Siding Contractors				
238330	Flooring Contractors				
238350	Finish Carpentry Contractors				
321113	Sawmills				
321114	Wood Preservation				
321211	Hardwood Veneer and Plywood Manufacturing				
321212	Softwood Veneer and Plywood Manufacturing				
321213	Engineered Wood Member (except Truss) Manufacturing				
321214	Truss Manufacturing				
321219	Reconstituted Wood Product Manufacturing				

³⁵The Economic Importance and Wood Flows from Vermont's Forests, 2007.

http://www.nefainfo.org/publications/2007%20Publications/NEFAEconomicImportVT.pdf

³⁶New York Times: Forest & Wood Products.

321911	Wood Window and Door Manufacturing
321912	Cut Stock, Resawing Lumber, and Planing
321918	Other Millwork (including Flooring)
321920	Wood Container and Pallet Manufacturing
321991	Manufactured Home (Mobile Home) Manufacturing
321992	Prefabricated Wood Building Manufacturing
321999	All Other Miscellaneous Wood Product Manufacturing
322110	Pulp Mills
322121	Paper (except Newsprint) Mills
322122	Newsprint Mills
322130	Paperboard Mills
322211	Corrugated and Solid Fiber Box Manufacturing
322212	Folding Paperboard Box Manufacturing
322213	Setup Paperboard Box Manufacturing
322214	Fiber Can, Tube, Drum, and Similar Products Manufacturing
322215	Nonfolding Sanitary Food Container Manufacturing
322221	Coated and Laminated Packaging Paper Manufacturing
322222	Coated and Laminated Paper Manufacturing
322223	Coated Paper Bag and Pouch Manufacturing
322224	Uncoated Paper and Multiwall Bag Manufacturing
322225	Laminated Aluminum Foil Manufacturing for Flexible Packaging Uses
322226	Surface-Coated Paperboard Manufacturing
322231	Die-Cut Paper and Paperboard Office Supplies Manufacturing
322232	Envelope Manufacturing
322233	Stationery, Tablet, and Related Product Manufacturing
322291	Sanitary Paper Product Manufacturing
322299	All Other Converted Paper Product Manufacturing
323117	Books Printing
325191	Gum and Wood Chemical Manufacturing
325510	Paint and Coating Manufacturing
325520	Adhesive Manufacturing
327910	Abrasive Product Manufacturing
332213	Saw Blade and Handsaw Manufacturing
333210	Sawmill and Woodworking Machinery Manufacturing
333291	Paper Industry Machinery Manufacturing
333991	Power-Driven Handtool Manufacturing
337110	Wood Kitchen Cabinet and Countertop Manufacturing
337121	Upholstered Household Furniture Manufacturing
337122	Non-upholsteredWood Household Furniture Manufacturing
337127	Institutional Furniture Manufacturing
337129	Wood Television, Radio, and Sewing Machine Cabinet Manufacturing
337211	Wood Office Furniture Manufacturing
337212	Custom Architectural Woodwork and Millwork Manufacturing
	-

337215	Showcase, Partition, Shelving, and Locker Manufacturing
337920	Blind and Shade Manufacturing
339992	Musical Instrument Manufacturing
339995	Burial Casket Manufacturing
423210	Furniture Merchant Wholesalers
423310	Lumber, Plywood, Millwork, and Wood Panel Merchant Wholesalers

Summary and Conclusions

Assets

- Increased demand for environmental friendly, "green" wood products for children's toys.
- State's reputation for high quality goods and craftsmanship enabling higher prices on goods.
- Access to 4.46 million acres of forested land, including 4.35 million acres classified by USDA
 Forest Service as timberland or land that is fertile and accessible enough to produce wood as a
 crop.
- As the residential housing construction market strengthens following the Great Recession there will be increased demand for household furniture and construction products and materials.
- Vermont's forests contribute significant revenue to the State's economy through manufacturing and forest-related recreation and tourism.
- High concentrations in Non-upholstered Wood Household Furniture Manufacturing, Hardwood Veneer and Plywood Manufacturing, and All Other Miscellaneous Wood Product Manufacturing
- Vermont Wood Marketing Council is tasked with promoting the brand of Vermont wood products and promoting the high quality goods. A plan is in place to do this work and to create a business friendly environment for the wood products sector.
- State support for investing in the forestry sector through the Working Lands Enterprise Fund and the expansion of technical assistance programs to include the forest product sectors.
 Technical assistance programs include the Vermont Agricultural Development Program and Farm Viability Program.

Challenges

- Lack of workforce with necessary skillset.
- Overall declining industry with decreasing employment and low wages.
- Competition from other less expensive products such as plastics and rubbers will make it difficult for wood products to regain employment lost.
- The Non-upholstered Wood Household Furniture manufacturing industry has a very strong location quotient (over 10) compared to the national average but it is projected to lose employment, suggesting a decline in a very important industry.
- The growing prominence of import penetration, specifically from emerging economies (e.g. China), has further hampered the industry's growth prospects. These countries' low labor and overhead costs allow them to offer lower prices on comparable products, effectively eroding domestic demand for U.S.-made products.

• Lack of innovation, not investing in new equipment or employees, high energy costs, high insurance costs, and retention and recruitment of employees³⁷

Data Findings

In 2013, total employment in the Forestry and Wood Products Cluster in Vermont totaled 10,265. This represented 2.87% of all employment in Vermont in 2013.

In 2012, the latest year for which establishment data is available, there were 660 total establishments in the Forestry Cluster in Vermont representing 2.70% of all establishments in Vermont. The average establishment size in the Forestry Cluster was 16 employees per establishment compared to an average establishment size of 14.5 in Vermont for all industries.

In terms of industry concentration as measured by national location quotient, industries that show a significant concentration of employment in Vermont compared to the national average include: Non-upholstered Wood Household Furniture Manufacturing (10.05), Finish Carpentry Contractors (1.49), Logging (3.68), Sawmills (2.79), Paperboard Mills (6.73), All Other Miscellaneous Wood Product Manufacturing (7.20), Hardwood Veneer and Plywood Manufacturing (9.90), Support Activities for Forestry (3.72), and many others.

Between 2008 and 2013 the Forestry and Wood Products Cluster lost 24% of employment (2,455 jobs). Losses were experienced in the Non-upholstered Wood Household Furniture Manufacturing industry (482 jobs lost), Finish Carpentry Contractors (265 jobs lost), and Logging (197 jobs lost). Some gains were made in industries such as Other Millwork (63 jobs added) and Institutional Furniture Manufacturing (53 jobs added). Overall the Forestry Cluster is projected to continue to lose employment between 2013 and 2023 (619 jobs lost or 8%).

In 2013 top occupations in the Forestry Cluster include Woodworking Machine Setters, Operators and Tenders (632 jobs), Carpenters (609 jobs), Cabinetmakers and Bench Carpenters (378 jobs), and Logging Equipment Operators (341 jobs).

Between 2013 and 2023 occupation growth in the Forestry Cluster is projected to be driven by Cabinet Makers and Bench Carpenters (50 jobs to be gained), Sawing Machine Setters, Operators, and Tenders, Wood (31 jobs to be gained), and Woodworking Machine Setters, Operators, and Tenders, Except Sawing (26 jobs to be gained).

Average wages for the Forestry Cluster in Vermont are roughly \$43,000 per year, slightly higher than wages in all industries in Vermont which in 2013 were \$38,401 on average annually. Most occupations in the Forestry Cluster require on-the-job training.

Existing Conditions

Forestry and Wood Products Cluster - Current Employment and Establishments % of Emp. 2013 % of # of **NAICS** Description VT LQ per Jobs Cluster Est. Jobs Est. Non-upholstered Wood Household 337122 1,480 14.42% 0.41% 32 46 10.05 Furniture Manufacturing 238350 Finish Carpentry Contractors 1,111 10.82% 0.31% 122 9 1.49 113310 834 8.12% 0.23% 76 11 3.68 Logging

³⁷ Economic Importance and Wood Flows from Vermont's Forests, http://www.vtfpr.org/includes/documents/ecimportfor.pdf

238160	Poofing Contractors	679	6.61%	0.19%	74	9	0.99
321113	Roofing Contractors Sawmills	548	5.34%	0.19%	36	15	2.79
322130	Paperboard Mills	542	5.28%	0.15%	3	181	6.73
	All Other Miscellaneous Wood						
321999	Product Manufacturing	517	5.04%	0.14%	23	22	7.20
321211	Hardwood Veneer and Plywood	463	4.51%	0.13%	5	93	9.90
	Manufacturing						
238330	Flooring Contractors	423	4.12%	0.12%	46	9	1.11
321911	Wood Window and Door Manufacturing	358	3.49%	0.10%	8	45	2.43
423310	Lumber, Plywood, Millwork, and Wood Panel Merchant Wholesalers	336	3.27%	0.09%	39	9	1.70
238130	Framing Contractors	284	2.77%	0.08%	35	8	1.00
337215	Showcase, Partition, Shelving, and Locker Manufacturing	284	2.77%	0.08%	6	47	1.79
337110	Wood Kitchen Cabinet and Countertop Manufacturing	252	2.45%	0.07%	23	11	0.90
322222	Coated and Laminated Paper Manufacturing	232	2.26%	0.06%	3	77	0.84
321992	Prefabricated Wood Building Manufacturing	197	1.92%	0.06%	8	25	2.31
322121	Paper (except Newsprint) Mills	186	1.81%	0.05%	2	93	1.28
321912	Cut Stock, Resawing Lumber, and Planing	144	1.40%	0.04%	7	21	2.19
115310	Support Activities for Forestry	138	1.34%	0.04%	25	6	3.72
321918	Other Millwork (including Flooring)	135	1.32%	0.04%	7	19	2.19
238170	Siding Contractors	105	1.02%	0.03%	21	5	0.80
321920	Wood Container and Pallet Manufacturing	94	0.92%	0.03%	7	13	0.41
322291	Sanitary Paper Product Manufacturing	92	0.90%	0.03%	1	92	
321991	Manufactured Home (Mobile Home) Manufacturing	68	0.66%	0.02%	2	34	1.56
323117	Books Printing	68	0.66%	0.02%	2	34	0.97
322215	Nonfolding Sanitary Food Container Manufacturing	61	0.59%	0.02%	0	61	0.00
333991	Power-Driven Handtool Manufacturing	59	0.57%	0.02%	1	59	2.38
113110	Timber Tract Operations	57	0.56%	0.02%	2	29	2.78
339992	Musical Instrument Manufacturing	56	0.55%	0.02%	9	6	0.99
333291	Paper Industry Machinery Manufacturing	54	0.53%	0.02%	0	54	0.00
322211	Corrugated and Solid Fiber Box Manufacturing	52	0.51%	0.01%	2	26	0.07
337211	Wood Office Furniture Manufacturing	45	0.44%	0.01%	3	15	1.35
423210	Furniture Merchant Wholesalers	45	0.44%	0.01%	10	5	0.27
325510	Paint and Coating Manufacturing	40	0.39%	0.01%	3	13	0.31
327910	Abrasive Product Manufacturing	37	0.36%	0.01%	2	19	0.63
337212	Custom Architectural Woodwork and Millwork Manufacturing	36	0.35%	0.01%	2	18	0.89
337920	Blind and Shade Manufacturing	33	0.32%	0.01%	3	11	1.37

113210	Forest Nurseries and Gathering of Forest Products	24	0.23%	0.01%	0	24	
321114	Wood Preservation	20	0.19%	0.01%	2	10	
321214	Truss Manufacturing	17	0.17%	0.00%	0	17	0.00
325520	Adhesive Manufacturing	15	0.15%	0.00%	2	8	0.46
332213	Saw Blade and Handsaw Manufacturing	13	0.13%	0.00%	1	13	2.56
337121	Upholstered Household Furniture Manufacturing	11	0.11%	0.00%	2	6	0.27
Forestry Total	and Wood Products Cluster	10,265	100.00%	2.87%	660	16	

Source: QCEW Employees, Non-QCEW Employees & Self-Employed - EMSI 2013.4 Class of Worker Note: Industries with fewer than 10 employees not included

Industry Data *Historic 2008-2013*

	Forestry and Wood Products Cluster	· - Historic (Growth	Forestry and Wood Products Cluster - Historic Growth					
NAICS	Description	2008	2013	#	%				
INAICS	Description	Jobs	Jobs	Change	Change				
321918	Other Millwork (including Flooring)	135	198	63	47%				
337127	Institutional Furniture Manufacturing	<10	58	53	1060%				
423310	Lumber, Plywood, Millwork, and Wood Panel Merchant Wholesalers	336	362	26	8%				
337121	Upholstered Household Furniture Manufacturing	11	35	24	218%				
115310	Support Activities for Forestry	138	159	21	15%				
332213	Saw Blade and Handsaw Manufacturing	13	29	16	123%				
322121	Paper (except Newsprint) Mills	186	198	12	6%				
337211	Wood Office Furniture Manufacturing	45	57	12	27%				
337920	Blind and Shade Manufacturing	33	42	9	27%				
325520	Adhesive Manufacturing	15	22	7	47%				
337212	Custom Architectural Woodwork and Millwork Manufacturing	36	40	4	11%				
321991	Manufactured Home (Mobile Home) Manufacturing	68	71	3	4%				
325510	Paint and Coating Manufacturing	40	29	(11)	-28%				
238170	Siding Contractors	105	93	(12)	-11%				
321114	Wood Preservation	20	<10	(15)	-75%				
333991	Power-Driven Handtool Manufacturing	59	44	(15)	-25%				
423210	Furniture Merchant Wholesalers	45	29	(16)	-36%				
321113	Sawmills	548	531	(17)	-3%				
321214	Truss Manufacturing	17	0	(17)	-100%				
337110	Wood Kitchen Cabinet and Countertop Manufacturing	252	234	(18)	-7%				
113210	Forest Nurseries and Gathering of Forest Products	24	<10	(19)	-79%				
323117	Books Printing	68	48	(20)	-29%				
327910	Abrasive Product Manufacturing	37	15	(22)	-59%				
113110	10 Timber Tract Operations		29	(28)	-49%				
339992	Musical Instrument Manufacturing	56	26	(30)	-54%				
321920	Wood Container and Pallet Manufacturing	94	57	(37)	-39%				

322211	Corrugated and Solid Fiber Box Manufacturing	52	14	(38)	-73%
333291	Paper Industry Machinery Manufacturing	54	0	(54)	-100%
322215	Nonfolding Sanitary Food Container Manufacturing	61	0	(61)	-100%
321912	Cut Stock, Resawing Lumber, and Planing	144	70	(74)	-51%
322130	Paperboard Mills	542	464	(78)	-14%
238330	Flooring Contractors	423	338	(85)	-20%
322291	Sanitary Paper Product Manufacturing	92	<10	(87)	-95%
238130	Framing Contractors	284	193	(91)	-32%
337215	Showcase, Partition, Shelving, and Locker Manufacturing	284	192	(92)	-32%
321911	Wood Window and Door Manufacturing	358	254	(104)	-29%
321211	Hardwood Veneer and Plywood Manufacturing	463	353	(110)	-24%
321992	Prefabricated Wood Building Manufacturing	197	69	(128)	-65%
321999	All Other Miscellaneous Wood Product Manufacturing	517	385	(132)	-26%
238160	Roofing Contractors	679	507	(172)	-25%
322222	Coated and Laminated Paper Manufacturing	232	55	(177)	-76%
113310	Logging	834	637	(197)	-24%
238350	Finish Carpentry Contractors	1,111	846	(265)	-24%
337122	Non-upholstered Wood Household Furniture Manufacturing	1,480	998	(482)	-33%
Forestry	and Wood Products Cluster Total	10,265	7,810	(2,455)	-24%

Source: QCEW Employees, Non-QCEW Employees & Self-Employed - EMSI 2013.4 Class of Worker Note: Industries with fewer than 10 employees in 2008 and 2013 not included. For industries with fewer than 10 employees in only one year, analyst assumes 5 employees for purposes of calculation.

Projected 2013-2023

	Forestry and Wood Products Cluster - Projected Growth					
NAICS	Description	2013 Jobs	2023 Jobs	# Change	% Change	
321918	Other Millwork (including Flooring)	198	470	272	137%	
337110	Wood Kitchen Cabinet and Countertop Manufacturing	234	503	269	115%	
321911	Wood Window and Door Manufacturing	254	466	212	83%	
337215	Showcase, Partition, Shelving, and Locker Manufacturing	192	324	132	69%	
321113	Sawmills	531	605	74	14%	
337127	Institutional Furniture Manufacturing	58	127	69	119%	
337121	Upholstered Household Furniture Manufacturing	35	98	63	180%	
423310	Lumber, Plywood, Millwork, and Wood Panel Merchant Wholesalers	362	414	52	14%	
332213	Saw Blade and Handsaw Manufacturing	29	58	29	100%	
337211	Wood Office Furniture Manufacturing	57	86	29	51%	
337920	Blind and Shade Manufacturing	42	66	24	57%	
337212	Custom Architectural Woodwork and Millwork Manufacturing	40	60	20	50%	
322130	Paperboard Mills	464	480	16	3%	
337129	Wood Television, Radio, and Sewing Machine Cabinet Manufacturing	<10	20	15	300%	

423210 Furniture Merchant Wholesalers 29 39 10 34% 321213 Engineered Wood Member (except Truss) Manufacturing <10 12 7 140% 115310 Support Activities for Forestry 159 165 6 4% 321211 Hardwood Veneer and Plywood Manufacturing 353 354 1 0% 238170 Siding Contractors 93 93 0 0% 322211 Corrugated and Solid Fiber Box Manufacturing 14 12 (2) -14% 339992 Musical Instrument Manufacturing 26 24 (2) -8% 327910 Abrasive Product Manufacturing 15 <10 (10) -67% 333991 Power-Driven Handtool Manufacturing 15 <10 (10) -67% 333991 Power-Driven Handtool Manufacturing 57 46 (11) -19% 321920 Wood Container and Pallet Manufacturing 57 46 (11) -19% 322222 Coated and Laminated Paper Manufact	325520	Adhesive Manufacturing	22	32	10	45%
Manufacturing	423210	J	29	39	10	34%
321211 Hardwood Veneer and Plywood Manufacturing 353 354 1 0% 238170 Siding Contractors 93 93 0 0% 322211 Corrugated and Solid Fiber Box Manufacturing 14 12 (2) -14% 339992 Musical Instrument Manufacturing 26 24 (2) -8% 327910 Abrasive Product Manufacturing 15 <10	321213		<10	12	7	140%
238170 Siding Contractors 93 93 0 0% 322211 Corrugated and Solid Fiber Box Manufacturing 14 12 (2) -14% 339992 Musical Instrument Manufacturing 26 24 (2) -8% 327910 Abrasive Product Manufacturing 15 <10	115310	Support Activities for Forestry	159	165	6	4%
322211 Corrugated and Solid Fiber Box Manufacturing 14 12 (2) -14% 339992 Musical Instrument Manufacturing 26 24 (2) -8% 327910 Abrasive Product Manufacturing 15 <10	321211	Hardwood Veneer and Plywood Manufacturing	353	354	1	0%
339992 Musical Instrument Manufacturing 26 24 (2) -8% 327910 Abrasive Product Manufacturing 15 <10	238170	Siding Contractors	93	93	0	0%
327910 Abrasive Product Manufacturing 15 <10	322211	Corrugated and Solid Fiber Box Manufacturing	14	12	(2)	-14%
333991 Power-Driven Handtool Manufacturing 44 34 (10) -23% 321920 Wood Container and Pallet Manufacturing 57 46 (11) -19% 113110 Timber Tract Operations 29 15 (14) -48% 322222 Coated and Laminated Paper Manufacturing 55 31 (24) -44% 325510 Paint and Coating Manufacturing 29 <10	339992	Musical Instrument Manufacturing	26	24	(2)	-8%
321920 Wood Container and Pallet Manufacturing 57 46 (11) -19% 113110 Timber Tract Operations 29 15 (14) -48% 322222 Coated and Laminated Paper Manufacturing 55 31 (24) -44% 325510 Paint and Coating Manufacturing 29 <10	327910	Abrasive Product Manufacturing	15	<10	(10)	-67%
113110 Timber Tract Operations 29 15 (14) -48% 322222 Coated and Laminated Paper Manufacturing 55 31 (24) -44% 325510 Paint and Coating Manufacturing 29 <10	333991	Power-Driven Handtool Manufacturing	44	34	(10)	-23%
322222 Coated and Laminated Paper Manufacturing 55 31 (24) -44% 325510 Paint and Coating Manufacturing 29 <10	321920	Wood Container and Pallet Manufacturing	57	46	(11)	-19%
325510 Paint and Coating Manufacturing 29 <10	113110	Timber Tract Operations	29	15	(14)	-48%
322121 Paper (except Newsprint) Mills 198 173 (25) -13% 238330 Flooring Contractors 338 308 (30) -9% 323117 Books Printing 48 <10	322222	Coated and Laminated Paper Manufacturing	55	31	(24)	-44%
238330 Flooring Contractors 338 308 (30) -9% 323117 Books Printing 48 <10	325510	Paint and Coating Manufacturing	29	<10	(24)	-83%
323117 Books Printing 48 <10	322121	Paper (except Newsprint) Mills	198	173	(25)	-13%
321991 Manufactured Home (Mobile Home) Manufacturing 71 20 (51) -72% 321999 All Other Miscellaneous Wood Product Manufacturing 385 329 (56) -15% 321992 Prefabricated Wood Building Manufacturing 69 <10	238330	Flooring Contractors	338	308	(30)	-9%
321991 Manufacturing 71 20 (S1) -72% 321999 All Other Miscellaneous Wood Product Manufacturing 385 329 (56) -15% 321992 Prefabricated Wood Building Manufacturing 69 <10	323117	Books Printing	48	<10	(43)	-90%
321999 Manufacturing 385 329 (56) -15% 321992 Prefabricated Wood Building Manufacturing 69 <10	321991		71	20	(51)	-72%
321912 Cut Stock, Resawing Lumber, and Planing 70 <10	321999		385	329	(56)	-15%
238130 Framing Contractors 193 110 (83) -43% 238160 Roofing Contractors 507 413 (94) -19% 238350 Finish Carpentry Contractors 846 669 (177) -21% 113310 Logging 637 345 (292) -46% 337122 Non-upholstered Wood Household Furniture Manufacturing 998 159 (839) -84%	321992	Prefabricated Wood Building Manufacturing	69	<10	(64)	-93%
238160 Roofing Contractors 507 413 (94) -19% 238350 Finish Carpentry Contractors 846 669 (177) -21% 113310 Logging 637 345 (292) -46% 337122 Non-upholstered Wood Household Furniture Manufacturing 998 159 (839) -84%	321912	Cut Stock, Resawing Lumber, and Planing	70	<10	(65)	-93%
238350 Finish Carpentry Contractors 846 669 (177) -21% 113310 Logging 637 345 (292) -46% 337122 Non-upholstered Wood Household Furniture Manufacturing 998 159 (839) -84%	238130	Framing Contractors	193	110	(83)	-43%
113310 Logging 637 345 (292) -46% 337122 Non-upholstered Wood Household Furniture Manufacturing 998 159 (839) -84%	238160	Roofing Contractors	507	413	(94)	-19%
Non-upholstered Wood Household Furniture Manufacturing 998 159 (839) -84%	238350	Finish Carpentry Contractors	846	669	(177)	-21%
Manufacturing 998 159 (839) -84%	113310	Logging	637	345	(292)	-46%
Forestry and Wood Products Cluster Total 7,810 7,191 (619) -8%	337122		998	159	(839)	-84%
	Forestry	and Wood Products Cluster Total	7,810	7,191	(619)	-8%

Source: QCEW Employees, Non-QCEW Employees & Self-Employed - EMSI 2013.4 Class of Worker Note: Industries with fewer than 10 employees in 2013 and 2023 not included. For industries with fewer than 10 employees in only one year, analyst assumes 5 employees for purposes of calculation.

Occupation Data

	Forestry and Wood Products Cluster - Occupation Analysis (20 largest)							
SOC	Occupation	2013 Jobs	Annual Wages	Education Required				
51-7042	Woodworking Machine Setters, Operators, and Tenders, Except Sawing	632	\$27,560	Short-term on-the-job training				
47-2031	Carpenters	609	\$34,160	Long-term on-the-job training				
51-7011	Cabinetmakers and Bench Carpenters	378	\$29,180	Moderate-term on-the-job training				
45-4022	Logging Equipment Operators	341	\$26,820	Moderate-term on-the-job training				
51-7021	Furniture Finishers	245	\$26,160	Short-term on-the-job training				
51-2092	Team Assemblers	242	\$27,800	Moderate-term on-the-job training				

47-2181	Roofers	240	\$27,720	Moderate-term on-the-job training
47-2061	Construction Laborers	237	\$26,040	Short-term on-the-job training
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	197	\$49,740	Moderate-term on-the-job training
51-9196	Paper Goods Machine Setters, Operators, and Tenders	197	\$27,020	Moderate-term on-the-job training
51-7041	Sawing Machine Setters, Operators, and Tenders, Wood	194	\$31,300	Short-term on-the-job training
51-1011	First-Line Supervisors of Production and Operating Workers	169	\$51,580	Work experience in a related occupation
53-3032	Heavy and Tractor-Trailer Truck Drivers	152	\$34,820	Short-term on-the-job training
47-1011	First-Line Supervisors of Construction Trades and Extraction Workers	152	\$45,060	Work experience in a related occupation
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	118	\$24,960	Short-term on-the-job training
47-2141	Painters, Construction and Maintenance	114	\$28,140	Moderate-term on-the-job training
11-9199	Managers, All Other	106	\$47,400	Work experience in a related occupation
11-9021	Construction Managers	106	\$47,560	Bachelor's degree
43-3031	Bookkeeping, Accounting, and Auditing Clerks	103	\$33,200	Moderate-term on-the-job training
43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	97	\$29,900	Short-term on-the-job training

Note: Annual wages based on 2,000 hours per

year

Historic 2008-2013

For	estry and Wood Products Cluster - Historic C	Occupation Gr	owth (Top	20 Largest	Growth)
SOC	Occupation	2008 Jobs	2013 Jobs	# Change	% Change
Total	All Cluster Occupations	9,725	7,266	(2,459)	(25%)
41-1012	First-Line Supervisors of Non-Retail Sales Workers	31	45	14	45%
39-2021	Nonfarm Animal Caretakers	17	28	11	65%
39-2011	Animal Trainers	16	25	9	56%
49-9099	Installation, Maintenance, and Repair Workers, All Other	14	15	1	7%
51-4194	Tool Grinders, Filers, and Sharpeners	18	18	0	0%
47-3012	HelpersCarpenters	35	33	(2)	(6%)
51-9012	Separating, Filtering, Clarifying, Precipitating, and Still Machine Setters, Operators, and Tenders	31	29	(2)	(6%)
45-4011	Forest and Conservation Workers	26	24	(2)	(8%)
33-9032	Security Guards	12	10	(2)	(17%)

45-2092	Farmworkers and Laborers, Crop, Nursery, and Greenhouse	12	10	(2)	(17%)
49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	22	19	(3)	(14%)
51-8021	Stationary Engineers and Boiler Operators	21	18	(3)	(14%)
19-1032	Foresters	19	16	(3)	(16%)
53-1031	First-Line Supervisors of Transportation and Material-Moving Machine and Vehicle Operators	16	13	(3)	(19%)
51-9023	Mixing and Blending Machine Setters, Operators, and Tenders	15	12	(3)	(20%)
15-1142	Network and Computer Systems Administrators	14	11	(3)	(21%)
51-9051	Furnace, Kiln, Oven, Drier, and Kettle Operators and Tenders	14	11	(3)	(21%)
15-1151	Computer User Support Specialists	13	10	(3)	(23%)
49-2094	Electrical and Electronics Repairers, Commercial and Industrial Equipment	13	10	(3)	(23%)
53-1021	First-Line Supervisors of Helpers, Laborers, and Material Movers, Hand	13	10	(3)	(23%)

Projected 2013-2023

Fore	stry and Wood Products Cluster - Projected	Occupation G	Frowth (To	p 20 Largest	: Growth)
SOC	Occupation	2013 Jobs	2023 Jobs	# Change	% Change
Total	All Cluster Occupations	7,266	6,667	(599)	(8%)
51-7011	Cabinetmakers and Bench Carpenters	378	428	50	13%
51-7041	Sawing Machine Setters, Operators, and Tenders, Wood	194	225	31	16%
51-7042	Woodworking Machine Setters, Operators, and Tenders, Except Sawing	632	658	26	4%
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	118	139	21	18%
51-2092	Team Assemblers	242	258	16	7%
43-9061	Office Clerks, General	38	53	15	39%
51-2099	Assemblers and Fabricators, All Other	45	58	13	29%
53-7051	Industrial Truck and Tractor Operators	83	96	13	16%
51-9198	HelpersProduction Workers	72	85	13	18%
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	197	208	11	6%
47-3012	HelpersCarpenters	33	43	10	30%
49-9041	Industrial Machinery Mechanics	52	61	9	17%
51-4031	Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic	15	21	6	40%
13-1051	Cost Estimators	48	54	6	13%
53-3032	Heavy and Tractor-Trailer Truck Drivers	152	158	6	4%
53-7063	Machine Feeders and Offbearers	31	37	6	19%
53-3033	Light Truck or Delivery Services Drivers	31	36	5	16%

43-4051	Customer Service Representatives	39	44	5	13%
39-2021	Nonfarm Animal Caretakers	28	32	4	14%
39-2011	Animal Trainers	25	28	3	12%

Market Research

The Forestry and Wood Products industry makes up a small portion of the State's employment (nearly 3%) and has seen declining employment historically and projected into the future. While these statistics would normally lead an analyst to eliminate a cluster as a target, the Forestry and Wood Products Cluster has such historical importance for the State, and is very important to specific regions, that additional research was conducted to identify opportunities.

Similar to the potential for the "Made in Vermont" brand's importance in Food Production, there is also value associated with Vermont quality furniture and wood products. The *Coos County Industry Sector Study and Strategic Plans* notes that consumers who have already purchased items made in the Northern Forest region are 2.5 times more likely to purchase a Vermont branded item again and those Vermont branded items can command up to a 6 percent premium. There is clearly an association between the Made in Vermont brand and high quality craftsmanship and value, a perception that will benefit companies manufacturing products in the State by allowing them to increase their prices and maintain financial viability.³⁸

Market research was conducted on the following:

- Cabinet and Vanity Manufacturing
- Household Furniture Manufacturing
- Millwork
- Office Furniture Manufacturing
- Miscellaneous Wood Product Manufacturing

The following section provides additional information about these industries.

<u>Cabinet and Vanity Manufacturing (NAICS 33711)</u>: This industry includes businesses that manufacture kitchen cabinets, bathroom vanities and countertops, primarily made of wood or wood coverings, but include plastics lamination. The cabinets and counters may be made on a stock or custom basis. Manufacturers distribute their products to wholesalers, contract outfitters and home improvement stores in the United States. This industry in Vermont has a location quotient of 0.90, indicating that the concentration of employment in this industry is less than the national average.

Nationally the Cabinet and Vanity Manufacturing industry has been severely set back by prolonged and substantial declines in the home construction and remodeling markets. Homebuilders, architects, designers, retailers and consumers purchase most industry goods during the construction of new houses or as part of a kitchen or bath remodeling project. Unfortunately for the industry, these markets contracted significantly because of weak consumer spending and a severe drop in investment into single-family residential construction during and after the recession.

Responding to this weakened demand, industry firms shut down manufacturing plants and slashed jobs. Between 2008 and 2013, the number of companies operating in the industry declined at an estimated average annual rate of 0.2% to 8,893. Industry employment is expected to fall at an annualized rate of 3.6% during the same period to 98,980 workers. Industry profit also was impacted by weak demand and the price volatility of certain commodities and raw materials; however, profit margins are up slightly during the period, thanks to stronger demand from residential construction markets during the past two years.

³⁸http://www.vermontwood.com/sites/all/files/press-releases/when-it-comes-furniture-making-vermont-player.pdf

Target Sector & Cluster Analysis – Appendix D

Revenue returned to growth in 2011 and is expected to expand 13.5% in 2013 over 2012 levels, as consumer spending grows and the housing market stabilizes. IBISWorld expects steady growth for the industry in the five years to 2018, with revenue projected to increase at an annualized rate of 4.1% to \$17.0 billion. Demographics will play a key role in the demand for housing, as a large segment of the population gearing up to enter the homeowners market encounters a limited inventory of new houses. As more people buy homes, housing starts will accelerate and demand for industry products will increase. Additionally, due to deferred maintenance during the downturn, a large number of properties will be in need of rehabilitation, which will include upgrades to kitchen cabinetry and bath vanities.

Examples of companies in this industry include Knight Industries, Vermont Custom Wood Products, Vermont Marble, Granite, Slate & Soapstone, Killington Cabinets, and Creative Counters.

The information in this section is sourced directly and solely from IBISWorld.

<u>Household Furniture Manufacturing (NAICS 33712)</u>: This industry manufactures a range of furniture for personal, household and public use. Public furniture is used for hospitals, theaters, cafeterias, schools and other facilities. Furniture may be made on a stock or custom basis and may be sold, assembled or unassembled. A principal target for Vermont is NAICS 337122 Non-upholstered Wood Household Furniture Manufacturing and NAICS 337129 Wood Television, Radio, and Sewing Machine Cabinet Manufacturing. The location quotient for Household and Institutional Furniture Manufacturing in Vermont is nearly 3.60.

In the five years to 2013, the Household Furniture Manufacturing industry suffered as consumer disposable income fell due to the effects of the recession. With less disposable income, consumers were forced to cut back on expenses, inhibiting industry growth. Additionally, the recession forced delays in housing starts, another major driver for the industry. Because the total number of homes influences the number of consumers in the market for new household furniture, when housing starts plummeted 35.6% in 2009, industry revenue subsequently fell 27.9%.

The growing prominence of import penetration, specifically from emerging economies (e.g. China), further hampered the industry's growth prospects. These countries' low labor and overhead costs allow them to offer lower prices on comparable products, effectively eroding domestic demand for U.S.-made products. Despite these challenges, IBISWorld expects industry revenue to grow 6.3% to \$24.5 billion in 2013, driven by the revival of disposable income and housing starts. Additionally, the rise in housing starts will fuel industry demand as consumers look to furnish their new homes. Nevertheless, industry operators will continue to face challenges over the next five years, despite anticipated growth early on. The expected rise in disposable income and housing starts will cause demand for household furniture to grow in the short-term, but the influx of low-cost imports is expected to thwart long-term gains. As a result, industry revenue is forecast to fall at an annualized rate of 1.1% in the five years to 2018 to \$23.1 billion.

Examples of companies within this industry include Ethan Allen Retail, Great Brook Furniture, Vermont Furniture Designs, Clear Lake Furniture, and Anders Woodworking.

The information in this section is sourced directly and solely from IBISWorld.

Millwork (NAICS 32191): This industry manufactures hardwood and softwood cut stock and dimension stock (lumber and worked wood products cut or shaped into specific sizes); wood windows and doors; and other millwork including wood flooring. The reshaped wood products are sold mainly to housing and other building construction industries and their contractors, in addition to other wood product distributors. The Millwork industry in Vermont has a location quotient of 2.30, indicating a strong concentration of employment in this industry compared to the rest of the US average.

During 2008, housing starts plummeted, cutting into demand for the industry's wood products. Nonresidential construction also declined steadily through 2010, contributing to the industry's losses. However, with the recent turnaround in the construction market, demand for millwork products has begun to rebound. IBISWorld expects that revenue, buoyed by 25% growth in housing starts, will rise 13.6% in 2013. However, the industry's recent growth is not expected to offset recession-induced losses. Consequently, over the five years to 2013, revenue is estimated to decline at an annualized rate of 1.0% to \$24.8 billion.

The Millwork industry has also been challenged by rising competition from wood-substitute products. Windows and door frames made of fiberglass, aluminum, steel and vinyl have become increasingly popular due to their durability and lower price tags. Over the five years to 2018, conditions are expected to improve for operators, with revenue forecast to increase at an annualized rate of 6.4% to \$33.9 billion. Recovery of the residential construction market is expected to accelerate in 2014, reviving demand for the industry. Also, rising per capita disposable income following the recession will positively affect investment in remodeling activity. Nevertheless, the industry will continue to face competition from substitute products and low-cost imports.

Examples of companies classified under the Millwork industry include Jeld-Wen, Vermont Quality Wood Products, The Woodstove Company, Vermont Furniture Hardwoods, Appalachian Engineered Flooring, Timberknee, Keen Woodworking, Jericho Woodworking, and Artistic Woodworks.

The information in this section is sourced directly and solely from IBISWorld.

<u>Miscellaneous Wood Product Manufacturing (NAICS 321999)</u>: This industry is composed of manufacturers of veneer, engineered wood, millwork wood or wood products that are not produced by sawmills. The industry includes miscellaneous wood products such as ladders, kitchenware, kiln-dried lumber, reels and toothpicks. It does not include wood containers, pallets or manufactured or prefabricated homes. The national location quotient for this industry in Vermont is very high, at 7.20 compared to the national average of 1.00.

Although the Wood Product Manufacturing industry produces a diverse range of wood products, demand mostly depends on the level of residential construction and downstream household spending patterns. Industry products include wood ladders, wood handles for hand tools, kiln-dried lumber, wood flour, fencing, and household items such as bowls, cutting boards, clothespins and rolling pins. After facing significant declines through the recession due to plummeting housing construction and decreased household spending, demand turned the corner in 2010 and has grown steadily through the recovery period. Rising household income and a moderate rebound in housing starts have driven demand. From 2008 to 2013, revenue is expected to increase at an average annual rate of 1.2% to \$6.3 billion. In 2013 alone, revenue is forecast to rise a robust 7.4%.

Over the five years to 2018, industry sales are projected to pick up as the housing market recovers. While not anticipated to reach prerecession levels, housing construction is expected to level off at about 1.9 million units toward the end of the period. As a result of heightened demand for wood products for construction and increased household spending, industry revenue is forecast to increase at an average annual rate of 7.0%, reaching \$8.8 billion by 2018. However, the industry will likely be challenged by increased competition from rubber, steel, aluminum and plastic substitutes and rising import penetration of low-cost wood products.

Examples of companies that fall under this classification include Newport Furniture Parts Corporation, Concept2, Inc., Green Mountain Wood Products, Vermont Wood Pellet Company, Stark Mountain Woodworks Company, Wood Dynamics Corporation, and Vermont Hand Carved Signs, Inc.

The information in this section is sourced directly and solely from IBISWorld.

Insights from Previous Reports

The following is an overview of information from a review of previous reports as they relate to the Forestry and Wood Products Cluster in Vermont.

The Economic Importance and Wood Flows from Vermont's Forests

This report was written to highlight the role that the forest plays in the Vermont economy, including forest-based manufacturing and forest-related recreation and tourism. Written in 2007, the information is slightly dated, but still provides good background regarding the role that the forest plays in Vermont's economy. The report notes the challenges that face the industry including lack of innovation, not investing in new equipment or employees, high energy costs, high insurance costs, and retention and recruitment of employees. The report also notes that Vermont exports wood outside of the State to be processed elsewhere. Almost all of the spruce and fir harvested in Vermont leaves the state for processing with Canada being the destination for the majority of these logs. The shipment of logs out of state leads to a decrease in the employment and earning potential related to those logs in state

The report notes that "the economic importance of Vermont's forest is significant. In a predominantly rural state, the forest provides important jobs and payroll for 13,000 people and an important source of income for forest landowners. The sale of forest products adds \$1 billion to the state's economy. Additionally, the forest attracts millions of visitors to the state for recreation and tourism activities, contributing almost \$500 million. Altogether, the contribution of forest based manufacturing and forest-related recreation and tourism to Vermont's economy is over \$1.5 billion."³⁹

Vermont Wood Products Sector – Strategic Plan Update

This report was written in 2011 to update the 2002 study and strategic plan written to strengthen the wood products industry in Vermont. The report highlights the changing consumer preferences for "Made in USA", green and earth friendly wood products, and wariness of quality deficiencies of products made overseas. Furthermore, the report notes the importance of the wood products industry being able to be flexible, change with the times, and innovate their process to meet consumer needs.⁴⁰

Some of the primary action items highlighted in this study include:

- Implement Continuous Improvement in the Sector including hiring a full time Executive Director for the Vermont Wood Marketing Council
- Strengthen and Promote the Vermont Quality Wood Products Brand & Logo including forming a brand enhancement task force, and reviving the Vermont Quality Products Brand and Logo and tying it to "Made in the USA"
- Promote Value-Added Wood Products to New and Existing Markets and Promote the Sector in Vermont and Surrounding Areas
- Improve Competitiveness of the Sector by promoting productivity, revitalizing Vermont's sawmills, and creating strategic partnerships.

³⁹http://www.vtfpr.org/includes/documents/ecimportfor.pdf

⁴⁰ Vermont Wood Products Sector Strategic Plan Update. Prepared by Dossenbach Associates, Inc. for The Vermont Wood Products Marketing Council.

- Build a Viable Educational and Training System to Support this Sector of the Working Landscape including forming an education and training task force and programming for the public school system.
- Create a Wood Certification System for Vermont's Wood Products Sector and use certification scheme as a marketing tool to connect with the brand
- Create a Positive Business Climate for Economic Development in the Wood Products Sector including holding public forums and creating a task force to analyze real and perceived constraints.

Health Care and Life Sciences

Cluster Description

The Health Care and Life Sciences Cluster is a major employer in the state, with growing levels of employment and high wages. The cluster includes not only the direct service providers such as doctors and dentists but also research and development, instrument manufacturing, and hospital facilities.

Research into the cluster suggests that many industries within the Health Care and Life Sciences Cluster will choose to locate close to one another to help feed off of research and developments, workforce, and supply chains. The clustering effect is typically very strong with health care related industries.

The following table contains a list of the industries included in this analysis of the Health Care and Life Sciences Cluster.

	Health Care and Life Sciences Cluster
NAICS	Description
Code	·
325411	Medicinal and Botanical Manufacturing
325412	Pharmaceutical Preparation Manufacturing
325413	In-Vitro Diagnostic Substance Manufacturing
325414	Biological Product (except Diagnostic) Manufacturing
39112	Surgical and Medical Instrument Manufacturing
39113	Surgical Appliance and Supplies Manufacturing
39114	Dental Equipment and Supplies Manufacturing
39115	Ophthalmic Goods Manufacturing
39116	Dental Laboratories
341711	Research and Development in Biotechnology
41712	Research and Development in the Physical, Engineering, and Life Sciences (except Biotechnology)
21111	Offices of Physicians (except Mental Health Specialists)
21112	Offices of Physicians, Mental Health Specialists
21210	Offices of Dentists
21310	Offices of Chiropractors
21320	Offices of Optometrists
21330	Offices of Mental Health Practitioners (except Physicians)
21340	Offices of Physical, Occupational and Speech Therapists, and Audiologists
21391	Offices of Podiatrists
21399	Offices of All Other Miscellaneous Health Practitioners
21410	Family Planning Centers
21420	Outpatient Mental Health and Substance Abuse Centers
21491	HMO Medical Centers
21492	Kidney Dialysis Centers
21310 21320 21330 21340 21391 21399 21410 221420 221491	Offices of Chiropractors Offices of Optometrists Offices of Mental Health Practitioners (except Physicians) Offices of Physical, Occupational and Speech Therapists, and Audiologists Offices of Podiatrists Offices of All Other Miscellaneous Health Practitioners Family Planning Centers Outpatient Mental Health and Substance Abuse Centers HMO Medical Centers

621493	Freestanding Ambulatory Surgical and Emergency Centers
621498	All Other Outpatient Care Centers
621511	Medical Laboratories
621512	Diagnostic Imaging Centers
621610	Home Health Care Services
621910	Ambulance Services
621991	Blood and Organ Banks
621999	All Other Miscellaneous Ambulatory Health Care Services
622110	General Medical and Surgical Hospitals (Private)
622210	Psychiatric and Substance Abuse Hospitals (Private)
622310	Specialty (except Psychiatric and Substance Abuse) Hospitals (Private)
623110	Nursing Care Facilities
623210	Residential Mental Retardation Facilities
623220	Residential Mental Health and Substance Abuse Facilities
623311	Continuing Care Retirement Communities
623312	Homes for the Elderly
623990	Other Residential Care Facilities
624110	Child and Youth Services
624120	Services for the Elderly and Persons with Disabilities
624190	Other Individual and Family Services
624310	Vocational Rehabilitation Services
624410	Child Day Care Services

Summary and Conclusions

Assets

- The health services component of this cluster is large in terms of employment, has grown historically and is projected to continue to grow. Even though this industry segment primarily serves the resident population and is not heavily export based, it is an important segment to Vermont because of the job opportunities. The industry is seeing both consolidation in terms of health systems and facilities but also growth of niche businesses.
- Pharmaceutical Preparation Manufacturing and Medicinal and Botanical Manufacturing are two
 industries that have grown over the last 5 years and are projected to continue to grow through
 2023. These industries offer an opportunity for the State in terms of supporting business
 attraction and retention. Vitamin and supplement manufacturing would build on the healthy
 living and whole food brand of Vermont while supporting well-paying manufacturing jobs.
- Aging population will require increasing amount of health care services required.
- Tele-medicine represents opportunity for growth with cross-section of IT and health services.
 Tele-medicine can increase access, improve care, and reduce costs and is an efficient way to provide high quality service to rural parts of the state.

Challenges

- Historic and projected employment increases will challenge the workforce system to provide quality workforce. Demand for skilled employees will continue to increase and educational systems should be prepared to meet that demand.
- Access to care/facilities in some rural areas presents challenge/unmet needs

- Health Care and Life Sciences is an important cluster for any state as it is a major employer and source of high paying jobs. However, unless there is a significant shift in the type and amount of R&D being performed it is unlikely that Vermont will be able to compete with other areas in Life Sciences fields.
- Low wages for large percentage of employees in the industry

Data Findings

In 2013, employment in the Health Care and Life Sciences Cluster in Vermont totaled 53,562 and is the largest employer of all the clusters studied in this report, representing 15% of all employment in Vermont in 2013.

As of 2012 reporting, there were just over 1,900 total establishments in the Health Care and Life Sciences Cluster, representing 7.83% of all establishments in Vermont. The average establishment size in the Health Care and Life Sciences Cluster was 28 employees per establishment, nearly double the size of the average establishment in Vermont for all industries.

In terms of industry concentration as measured by national location quotient, the industries that show significant concentration in Vermont compared to the national average include: Services for the Elderly and Persons with Disabilities (3.71), Outpatient Mental Health and Substance Abuse Centers (7.08), All Other Outpatient Care Centers (3.05), Offices of Mental Health Practitioners (3.07), Psychiatric and Substance Abuse Hospitals (Private) (2.62), Biological Product Manufacturing (2.02), and others.

Between 2008 and 2013 the Health Care and Life Sciences Cluster gained 3,301 new jobs, or a 7% increase in employment. The Services for the Elderly and Persons with Disabilities saw a large increase in employment with 1,234 jobs added. Offices of Physicians saw a decrease in 265 jobs during this time, as well as Other Residential Care Facilities that lost 201 jobs. Overall the Health Care and Life Sciences Cluster is projected to continue to increase employment with a projected 22% increase (11,862 jobs) between 2013 and 2023. Employment increases are projected to be led by Services for the Elderly and Persons with Disabilities (adding 5,233 jobs), and General Medical and Surgical Hospitals (Private) (1,692 jobs to be gained).

In 2013, occupations with the highest number of jobs in the Health Care and Life Sciences Cluster include Personal Care Aides (7,422 jobs), Registered Nurses (5,792 jobs), Nursing Assistants (2,832 jobs), Childcare Workers (2,411 jobs), and Social and Human Service Assistants (1,681 jobs).

Between 2013 and 2023 occupation growth in the Health Care and Life Sciences Cluster is projected to be driven by Personal Care Aides (3,468 jobs to be gained), Registered Nurses (991 jobs to be gained), and Home Health Aides (837 jobs to be gained).

Average wages for the Health Care and Life Sciences Cluster are approximately \$50,000 per year, however many of the occupations with the largest number of employees have lower wages such as Personal Care Aides and Childcare Workers. Occupations in the Health Care and Life Sciences Cluster require a range of education from short term on-the-job training to Master's degree and higher.

Existing Conditions

Health Care and Life Sciences Cluster - Current Employment and Establishments							
NAICS	Description	2013 Jobs	% of Cluster	% of VT Jobs	# of Est.	Emp. per Est.	LQ
622110	General Medical and Surgical Hospitals (Private)	12,457	23.26%	3.49%	17	733	1.18

624120	Services for the Elderly and Persons with Disabilities	8,077	15.08%	2.26%	72	112	3.71
621111	Offices of Physicians (except Mental Health Specialists)	4,857	9.07%	1.36%	342	14	0.84
623110	Nursing Care Facilities	3,911	7.30%	1.10%	57	69	0.99
624410	Child Day Care Services	3,814	7.12%	1.07%	255	15	1.32
621420	Outpatient Mental Health and Substance Abuse Centers	3,514	6.56%	0.98%	43	82	7.08
621610	Home Health Care Services	2,523	4.71%	0.71%	30	84	0.79
621210	Offices of Dentists	1,981	3.70%	0.55%	249	8	0.92
624190	Other Individual and Family Services	1,358	2.54%	0.38%	99	14	1.36
623311	Continuing Care Retirement Communities	1,115	2.08%	0.31%	25	45	1.09
623312	Homes for the Elderly	1,067	1.99%	0.30%	43	25	1.18
621498	All Other Outpatient Care Centers	927	1.73%	0.26%	23	40	3.05
621340	Offices of Physical, Occupational and Speech Therapists, and Audiologists	878	1.64%	0.25%	96	9	1.12
624110	Child and Youth Services	860	1.61%	0.24%	31	28	1.87
623220	Residential Mental Health and Substance Abuse Facilities	729	1.36%	0.20%	51	14	1.51
621330	Offices of Mental Health Practitioners (except Physicians)	688	1.28%	0.19%	53	13	3.07
622210	Psychiatric and Substance Abuse Hospitals (Private)	646	1.21%	0.18%	1	646	2.62
621910	Ambulance Services	531	0.99%	0.15%	28	19	1.30
621399	Offices of All Other Miscellaneous Health Practitioners	477	0.89%	0.13%	50	10	1.65
621310	Offices of Chiropractors	309	0.58%	0.09%	90	3	0.89
624310	Vocational Rehabilitation Services	299	0.56%	0.08%	21	14	0.36
623990	Other Residential Care Facilities	291	0.54%	0.08%	10	29	0.75
621320	Offices of Optometrists	247	0.46%	0.07%	45	5	0.83
541712	Research and Development in the Physical, Engineering, and Life Sciences (except Biotechnology)	234	0.44%	0.07%	49	5	0.22
325412	Pharmaceutical Preparation Manufacturing	212	0.40%	0.06%	4	53	0.43
339112	Surgical and Medical Instrument Manufacturing	189	0.35%	0.05%	4	47	0.66
621410	Family Planning Centers	152	0.28%	0.04%	14	11	2.51
339113	Surgical Appliance and Supplies Manufacturing	142	0.27%	0.04%	7	20	0.60
325414	Biological Product (except Diagnostic) Manufacturing	133	0.25%	0.04%	1	133	2.02
621991	Blood and Organ Banks	133	0.25%	0.04%	2	67	0.75
325411	Medicinal and Botanical Manufacturing	117	0.22%	0.03%	2	59	2.42
621112	Offices of Physicians, Mental Health Specialists	117	0.22%	0.03%	17	7	0.77
339115	Ophthalmic Goods Manufacturing	103	0.19%	0.03%	2	52	1.60
339116	Dental Laboratories	93	0.17%	0.03%	11	8	0.76
621492	Kidney Dialysis Centers	56	0.10%	0.02%	6	9	0.22

621511	Medical Laboratories	56	0.10%	0.02%	15	4	0.13
621999	All Other Miscellaneous Ambulatory Health Care Services	50	0.09%	0.01%	13	4	0.36
623210	Residential Mental Retardation Facilities	46	0.09%	0.01%	3	15	0.05
622310	Specialty (except Psychiatric and Substance Abuse) Hospitals (Private)	42	0.08%	0.01%	2	21	0.08
541711	Research and Development in Biotechnology	41	0.08%	0.01%	11	4	0.12
621493	Freestanding Ambulatory Surgical and Emergency Centers	37	0.07%	0.01%	2	19	0.13
621391	Offices of Podiatrists	30	0.06%	0.01%	13	2	0.34
621512	Diagnostic Imaging Centers	22	0.04%	0.01%	6	4	0.12
Health Care and Life Sciences Cluster Total		53,562	100.00%	15.00%	1,913	28	

Worker

Note: Industries with fewer than 10 employees not included

Industry Data *Historic 2008-2013*

	Health Care and Life Sciences Cluste	r - Historic	Growth		
NAICS	Description	2008 Jobs	2013 Jobs	# Change	% Change
624120	Services for the Elderly and Persons with Disabilities	6,843	8,077	1,234	18%
622110	General Medical and Surgical Hospitals (Private)	11,663	12,457	794	7%
621420	Outpatient Mental Health and Substance Abuse Centers	2,863	3,514	651	23%
623220	Residential Mental Health and Substance Abuse Facilities	467	729	262	56%
623311	Continuing Care Retirement Communities	884	1,115	231	26%
325412	Pharmaceutical Preparation Manufacturing	<10	212	207	4140%
621498	All Other Outpatient Care Centers	723	927	204	28%
622210	Psychiatric and Substance Abuse Hospitals (Private)	446	646	200	45%
624410	Child Day Care Services	3,647	3,814	167	5%
623312	Homes for the Elderly	913	1,067	154	17%
621399	Offices of All Other Miscellaneous Health Practitioners	349	477	128	37%
624110	Child and Youth Services	739	860	121	16%
621340	Offices of Physical, Occupational and Speech Therapists, and Audiologists	759	878	119	16%
325414	Biological Product (except Diagnostic) Manufacturing	25	133	108	432%
621610	Home Health Care Services	2,420	2,523	103	4%
325411	Medicinal and Botanical Manufacturing	20	117	97	485%
339115	Ophthalmic Goods Manufacturing	24	103	79	329%
621991	Blood and Organ Banks	76	133	57	75%

622310	Specialty (except Psychiatric and Substance Abuse) Hospitals (Private)	<10	42	37	740%
339113	Surgical Appliance and Supplies Manufacturing	117	142	25	21%
621493	Freestanding Ambulatory Surgical and Emergency Centers	15	37	22	147%
621320	Offices of Optometrists	228	247	19	8%
621511	Medical Laboratories	47	56	9	19%
621492	Kidney Dialysis Centers	49	56	7	14%
624310	Vocational Rehabilitation Services	297	299	2	1%
339116	Dental Laboratories	93	93	0	0%
541711	Research and Development in Biotechnology	43	41	(2)	-5%
621391	Offices of Podiatrists	33	30	(3)	-9%
621910	Ambulance Services	535	531	(4)	-1%
621112	Offices of Physicians, Mental Health Specialists	127	117	(10)	-8%
621410	Family Planning Centers	172	152	(20)	-12%
621512	Diagnostic Imaging Centers	48	22	(26)	-54%
621310	Offices of Chiropractors	342	309	(33)	-10%
541712	Research and Development in the Physical, Engineering, and Life Sciences (except Biotechnology)	291	234	(57)	-20%
623110	Nursing Care Facilities	4,006	3,911	(95)	-2%
623210	Residential Mental Retardation Facilities	142	46	(96)	-68%
339112	Surgical and Medical Instrument Manufacturing	326	189	(137)	-42%
624190	Other Individual and Family Services	1,505	1,358	(147)	-10%
621330	Offices of Mental Health Practitioners (except Physicians)	838	688	(150)	-18%
621210	Offices of Dentists	2,133	1,981	(152)	-7%
621999	All Other Miscellaneous Ambulatory Health Care Services	217	50	(167)	-77%
621491	HMO Medical Centers	176	0	(176)	-100%
623990	Other Residential Care Facilities	492	291	(201)	-41%
621111	Offices of Physicians (except Mental Health Specialists)	5,122	4,857	(265)	-5%
Health C	are and Life Sciences Cluster Total	50,261	53,562	3,301	7%
					

Source: QCEW Employees, Non-QCEW Employees & Self-Employed - EMSI 2013.4 Class of Worker Note: Industries with fewer than 10 employees in 2008 and 2013 not included. For industries with fewer than 10 employees in only one year, analyst assumes 5 employees for purposes of calculation.

Projected 2013-2023

Health Care and Life Sciences Cluster - Projected Growth									
NAICS	Description	2013 Jobs	2023 Jobs	# Change	% Change				
624120	Services for the Elderly and Persons with Disabilities	8,077	13,310	5,233	65%				
622110	General Medical and Surgical Hospitals (Private)	12,457	14,149	1,692	14%				
624410	Child Day Care Services	3,814	4,510	696	18%				
621420	Outpatient Mental Health and Substance Abuse Centers	3,514	3,982	468	13%				
623311	Continuing Care Retirement Communities	1,115	1,559	444	40%				
624110	Child and Youth Services	860	1,294	434	50%				
623312	Homes for the Elderly	1,067	1,499	432	40%				

621111 Offices of Physicians (except Mental Health Specialists) 4,857 5,274 417 9% (except Mental Health Specialists) 621498 All Other Outpatient Care Centers 927 1,259 332 36% 623220 Residential Mental Health and Substance Abuse 729 1,059 330 45% 621340 Offices of Physical, Occupational and Speech Therapists, and Audiologists 878 1,145 267 30% 622210 Psychiatric and Substance Abuse Hospitals (Private) 646 866 220 34% 621610 Home Health Care Services 2,523 2,710 187 7% 621910 Ambulance Services 531 686 155 29% 621910 Ambulance Services 531 686 155 29% 621939 Offices of All Other Miscellaneous Health 477 629 152 32% 339115 Ophthalmic Goods Manufacturing 103 240 137 133 320 108 51% 339116 Dental Laboratories 193						
623220 Residential Mental Health and Substance Abuse Facilities 729 1,059 330 45% 621340 Offices of Physical, Occupational and Speech Therapists, and Audiologists 878 1,145 267 30% 622210 Psychiatric and Substance Abuse Hospitals (Private) 646 866 220 34% 621610 Home Health Care Services 2,523 2,710 187 7% 621910 Ambulance Services 531 686 155 29% 621399 Offices of All Other Miscellaneous Health Practitioners 477 629 152 32% 621399 Offices of Dentise Goods Manufacturing 103 240 137 133% 339113 Surgical Appliance and Supplies Manufacturing 102 257 115 81% 339113 Surgical Appliance and Supplies Manufacturing 212 230 108 51% 325412 Pharmaceutical Preparation Manufacturing 212 320 108 51% 325411 Medicinal and Botanical Manufacturing 117 202 <t< td=""><td>621111</td><td>Offices of Physicians (except Mental Health Specialists)</td><td>4,857</td><td>5,274</td><td>417</td><td>9%</td></t<>	621111	Offices of Physicians (except Mental Health Specialists)	4,857	5,274	417	9%
6222/20 Facilities 7/29 1,059 330 49% 621340 Offices of Physical, Occupational and Speech Therapists, and Audiologists 878 1,145 267 30% 622210 Psychiatric and Substance Abuse Hospitals (Private) 646 866 220 34% 621910 Home Health Care Services 2,523 2,710 187 7% 621910 Ambulance Services 531 686 155 29% 621399 Offices of All Other Miscellaneous Health Practitioners 339113 240 137 133% 339115 Ophthalmic Goods Manufacturing 103 240 137 133% 325412 Pharmaceutical Preparation Manufacturing 142 257 115 81% 339115 Dental Laboratories 93 194 101 109% 325411 Medicinal and Botanical Manufacturing 117 202 85 73% 325411 Medicinal and Botanical Manufacturing 117 202 85 73% 621320 <	621498	All Other Outpatient Care Centers	927	1,259	332	36%
Therapists, and Audiologists	623220		729	1,059	330	45%
62210 (Private) 646 600 220 34% 621610 Home Health Care Services 2,523 2,710 187 7% 621910 Ambulance Services 531 686 155 29% 621399 Offices of All Other Miscellaneous Health Practitioners 477 629 152 32% 339115 Ophthalmic Goods Manufacturing 103 240 137 133% 339115 Ophthalmic Goods Manufacturing 142 257 115 81% 325412 Pharmaceutical Preparation Manufacturing 212 320 108 51% 339116 Dental Laboratories 93 194 101 109% 621210 Offices of Dentists 1,981 2,073 92 5% 325411 Medicinal and Botanical Manufacturing 117 202 85 73% 825130 Offices of Dentists 247 310 63 26% 621320 Offices of Optometrists 247 310 63 <	621340		878	1,145	267	30%
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Practitioners 477 629 152 32%	621910	Ambulance Services	531	686	155	29%
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339113 Surgical Appliance and Supplies Manufacturing 142 257 115 81% 325412 Pharmaceutical Preparation Manufacturing 212 320 108 51% 339116 Dental Laboratories 93 194 101 109% 621210 Offices of Dentists 1,981 2,073 92 5% 325411 Medicinal and Botanical Manufacturing 117 202 85 73% 325414 Medicinal and Botanical Manufacturing 118 207 39 36% 71 53% 325414 Manufacturing 118 204 71 53% 325414 Manufacturing 133 204 71 53% 621320 Offices of Optometrists 247 310 63 26% 621310 Offices of Chiropractors 309 366 57 18% 621330 Offices of Mental Health Practitioners (except Physicians) 621991 Blood and Organ Banks 133 166 33 25% 622910 Blood and Organ Banks 133 166 33 25% 622310 Specialty (except Psychiatric and Substance 42 73 31 74%	339115	Ophthalmic Goods Manufacturing	103	240	137	133%
325412		•				
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62310 Abuse) Hospitals (Private) 42 73 31 74% 621112 Offices of Physicians, Mental Health Specialists 117 138 21 18% 541711 Research and Development in Biotechnology 41 43 2 5% 621391 Offices of Podiatrists 30 30 0 0% 621512 Diagnostic Imaging Centers 22 21 (1) -5% 621410 Family Planning Centers 152 144 (8) -5% 621511 Medical Laboratories 56 48 (8) -14% 624310 Vocational Rehabilitation Services 299 282 (17) -6% 339112 Surgical and Medical Instrument Manufacturing 189 166 (23) -12% 621492 Kidney Dialysis Centers 56 29 (27) -48% 541712 Engineering, and Life Sciences (except Biotechnology) 37 <10	621991	<u> </u>	133	166	33	25%
541711 Research and Development in Biotechnology 41 43 2 5% 621391 Offices of Podiatrists 30 30 0 0% 621512 Diagnostic Imaging Centers 22 21 (1) -5% 621410 Family Planning Centers 152 144 (8) -5% 621511 Medical Laboratories 56 48 (8) -14% 624310 Vocational Rehabilitation Services 299 282 (17) -6% 339112 Surgical and Medical Instrument Manufacturing 189 166 (23) -12% 621492 Kidney Dialysis Centers 56 29 (27) -48% Research and Development in the Physical, 234 205 (29) -12% 541712 Engineering, and Life Sciences (except Biotechnology) 234 205 (29) -12% 623210 Residential Mental Retardation Facilities 46 14 (32) -70% 621999 All Other Miscellaneous Ambulatory Health Care Services 50 <10	622310		42	73	31	74%
621391 Offices of Podiatrists 30 30 0 0% 621512 Diagnostic Imaging Centers 22 21 (1) -5% 621410 Family Planning Centers 152 144 (8) -5% 621511 Medical Laboratories 56 48 (8) -14% 624310 Vocational Rehabilitation Services 299 282 (17) -6% 339112 Surgical and Medical Instrument Manufacturing 189 166 (23) -12% 621492 Kidney Dialysis Centers 56 29 (27) -48% Research and Development in the Physical, 234 205 (29) -12% 541712 Engineering, and Life Sciences (except Biotechnology) 234 205 (29) -12% 623493 Freestanding Ambulatory Surgical and Emergency Centers 37 <10	621112	Offices of Physicians, Mental Health Specialists	117	138	21	18%
621512 Diagnostic Imaging Centers 22 21 (1) -5% 621410 Family Planning Centers 152 144 (8) -5% 621511 Medical Laboratories 56 48 (8) -14% 624310 Vocational Rehabilitation Services 299 282 (17) -6% 339112 Surgical and Medical Instrument Manufacturing 189 166 (23) -12% 621492 Kidney Dialysis Centers 56 29 (27) -48% Research and Development in the Physical, Engineering, and Life Sciences (except Biotechnology) 234 205 (29) -12% 621493 Freestanding Ambulatory Surgical and Emergency Centers 37 <10	541711	Research and Development in Biotechnology	41	43	2	5%
621410 Family Planning Centers 152 144 (8) -5% 621511 Medical Laboratories 56 48 (8) -14% 624310 Vocational Rehabilitation Services 299 282 (17) -6% 339112 Surgical and Medical Instrument Manufacturing 189 166 (23) -12% 621492 Kidney Dialysis Centers 56 29 (27) -48% Research and Development in the Physical, Engineering, and Life Sciences (except Biotechnology) 234 205 (29) -12% 621493 Freestanding Ambulatory Surgical and Emergency Centers 37 <10	621391	Offices of Podiatrists	30	30	0	0%
621511 Medical Laboratories 56 48 (8) -14% 624310 Vocational Rehabilitation Services 299 282 (17) -6% 339112 Surgical and Medical Instrument Manufacturing 189 166 (23) -12% 621492 Kidney Dialysis Centers 56 29 (27) -48% Research and Development in the Physical, Biotechnology) 234 205 (29) -12% 621493 Freestanding Ambulatory Surgical and Emergency Centers 37 <10	621512	Diagnostic Imaging Centers	22	21	(1)	-5%
624310 Vocational Rehabilitation Services 299 282 (17) -6% 339112 Surgical and Medical Instrument Manufacturing 189 166 (23) -12% 621492 Kidney Dialysis Centers 56 29 (27) -48% Research and Development in the Physical, Engineering, and Life Sciences (except Biotechnology) 234 205 (29) -12% 621493 Freestanding Ambulatory Surgical and Emergency Centers 37 <10	621410	Family Planning Centers	152	144	(8)	-5%
339112 Surgical and Medical Instrument Manufacturing 189 166 (23) -12% 621492 Kidney Dialysis Centers 56 29 (27) -48% Research and Development in the Physical, Engineering, and Life Sciences (except Biotechnology) 234 205 (29) -12% 621493 Freestanding Ambulatory Surgical and Emergency Centers 37 <10	621511	Medical Laboratories	56	48	(8)	-14%
621492 Kidney Dialysis Centers 56 29 (27) -48% Research and Development in the Physical, 234 205 (29) -12% 541712 Engineering, and Life Sciences (except Biotechnology) 234 205 (29) -12% 621493 Freestanding Ambulatory Surgical and Emergency Centers 37 <10	624310	Vocational Rehabilitation Services	299	282	(17)	-6%
Research and Development in the Physical, Engineering, and Life Sciences (except Biotechnology) Freestanding Ambulatory Surgical and Emergency Centers Residential Mental Retardation Facilities All Other Miscellaneous Ambulatory Health Care Services All Other Residential Care Facilities Care Facilities Research and Development in the Physical, 234 205 (29) -12% 37 -12 623 All 0 Care Facilities Ca	339112	Surgical and Medical Instrument Manufacturing	189	166	(23)	-12%
541712 Engineering, and Life Sciences (except Biotechnology) 234 205 (29) -12% 621493 Freestanding Ambulatory Surgical and Emergency Centers 37 <10	621492	Kidney Dialysis Centers	56	29	(27)	-48%
Emergency Centers 37 <10 (32) -86% 623210 Residential Mental Retardation Facilities 46 14 (32) -70% 621999 All Other Miscellaneous Ambulatory Health Care Services 50 <10 (45) -90% 623990 Other Residential Care Facilities 291 142 (149) -51% 623110 Nursing Care Facilities 3,911 3,689 (222) -6%	541712	Engineering, and Life Sciences (except	234	205	(29)	-12%
621999 All Other Miscellaneous Ambulatory Health Care Services 50 <10	621493	, ,	37	<10	(32)	-86%
621999 All Other Miscellaneous Ambulatory Health Care Services 50 <10	623210	Residential Mental Retardation Facilities	46	14	(32)	-70%
623110 Nursing Care Facilities 3,911 3,689 (222) -6%		All Other Miscellaneous Ambulatory Health Care				
623110 Nursing Care Facilities 3,911 3,689 (222) -6%	623990	Other Residential Care Facilities	291	142	(149)	-51%
	623110	Nursing Care Facilities	3,911	3,689	` '	-6%
	Health C	•	53,562	65,424	11,862	22%

Note: Industries with fewer than 10 employees in 2013 and 2023 not included. For industries with fewer than 10 employees in only one year, analyst assumes 5 employees for purposes of calculation.

Occupation Data

	Health Care and Life Sciences C	Cluster - Occ	cupation Analy	sis (20 largest)
SOC	Occupation	2013 Jobs	Annual Wages	Education Required
39-9021	Personal Care Aides	7,422	\$21,160	Short-term on-the-job training
29-1141	Registered Nurses	5,792	\$58,680	Associate's degree
31-1014	Nursing Assistants	2,832	\$24,160	Postsecondary non-degree award
39-9011	Childcare Workers	2,411	\$17,580	Short-term on-the-job training
21-1093	Social and Human Service Assistants	1,681	\$28,040	Short-term on-the-job training
29-2061	Licensed Practical and Licensed Vocational Nurses	1,230	\$40,700	Postsecondary non-degree award
43-4171	Receptionists and Information Clerks	1,021	\$26,740	Short-term on-the-job training
29-1069	Physicians and Surgeons, All Other	988	\$162,140	First professional degree
43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	939	\$29,900	Short-term on-the-job training
43-6013	Medical Secretaries	932	\$32,240	Moderate-term on-the-job training
21-1023	Mental Health and Substance Abuse Social Workers	826	\$33,580	Master's degree
25-2011	Preschool Teachers, Except Special Education	749	\$30,980	Associate's degree
31-1011	Home Health Aides	712	\$23,540	Short-term on-the-job training
21-1014	Mental Health Counselors	697	\$35,100	Master's degree
11-9111	Medical and Health Services Managers	649	\$77,480	Bachelor's degree
31-9092	Medical Assistants	645	\$29,800	Moderate-term on-the-job training
29-1123	Physical Therapists	623	\$66,620	First professional degree
25-9041	Teacher Assistants	594	\$25,440	Short-term on-the-job training
29-2021	Dental Hygienists	531	\$64,240	Associate's degree
19-3031	Clinical, Counseling, and School Psychologists	505	\$59,680	Doctoral degree

Source: QCEW Employees, Non-QCEW Employees & Self-Employed - EMSI 2013.4 Class of Worker

Note: Annual wages based on 2,000 hours per

year

Historic 2008-2013

Heal	Ith Care and Life Sciences Cluster - Historic	Occupation (Growth (To	p 20 Largest	Growth)
SOC	Occupation	2008 Jobs	2013 Jobs	# Change	% Change
Total	All Cluster Occupations	49,493	52,786	3,293	7%
39-9021	Personal Care Aides	5,875	7,422	1,547	26%
29-1141	Registered Nurses	5,371	5,792	421	8%
21-1093	Social and Human Service Assistants	1,497	1,681	184	12%
21-1023	Mental Health and Substance Abuse Social Workers	701	826	125	18%
19-3031	Clinical, Counseling, and School Psychologists	416	505	89	21%
21-1014	Mental Health Counselors	621	697	76	12%
29-2041	Emergency Medical Technicians and Paramedics	411	477	66	16%
25-9041	Teacher Assistants	533	594	61	11%
29-2053	Psychiatric Technicians	173	232	59	34%
51-9111	Packaging and Filling Machine Operators and Tenders	20	78	58	290%
43-6013	Medical Secretaries	882	932	50	6%
29-1199	Health Diagnosing and Treating Practitioners, All Other	63	113	50	79%
25-2011	Preschool Teachers, Except Special Education	703	749	46	7%
39-9032	Recreation Workers	408	450	42	10%
31-1014	Nursing Assistants	2,791	2,832	41	1%
29-1123	Physical Therapists	584	623	39	7%
13-1041	Compliance Officers	136	175	39	29%
21-1094	Community Health Workers	318	356	38	12%
39-9011	Childcare Workers	2,378	2,411	33	1%
29-1127	Speech-Language Pathologists	239	272	33	14%

Source: QCEW Employees, Non-QCEW Employees & Self-Employed - EMSI 2013.4 Class of

Worker

Note: Annual wages based on 2,000 hours per year

Projected 2013-2023

Healt	Health Care and Life Sciences Cluster - Projected Occupation Growth (Top 20 Largest Growth)							
SOC	Occupation	2013 Jobs	2023 Jobs	# Change	% Change			
Total	All Cluster Occupations	52,786	64,698	11,912	23%			
39-9021	Personal Care Aides	7,422	10,890	3,468	47%			
29-1141	Registered Nurses	5,792	6,783	991	17%			
31-1011	Home Health Aides	712	1,549	837	118%			
39-9011	Childcare Workers	2,411	2,729	318	13%			
21-1093	Social and Human Service Assistants	1,681	1,995	314	19%			
31-1014	Nursing Assistants	2,832	3,076	244	9%			
43-6013	Medical Secretaries	932	1,134	202	22%			
25-2011	Preschool Teachers, Except Special Education	749	946	197	26%			
43-4171	Receptionists and Information Clerks	1,021	1,192	171	17%			

21-1023	Mental Health and Substance Abuse Social Workers	826	979	153	19%
29-2041	Emergency Medical Technicians and Paramedics	477	619	142	30%
25-9041	Teacher Assistants	594	734	140	24%
19-3031	Clinical, Counseling, and School Psychologists	505	643	138	27%
21-1014	Mental Health Counselors	697	832	135	19%
43-9061	Office Clerks, General	326	455	129	40%
29-2061	Licensed Practical and Licensed Vocational Nurses	1,230	1,342	112	9%
39-9032	Recreation Workers	450	556	106	24%
31-9092	Medical Assistants	645	751	106	16%
29-1123	Physical Therapists	623	712	89	14%
21-1022	Healthcare Social Workers	298	386	88	30%

Market Research

The Health Care and Life Sciences Cluster accounts for 15% of the total employment in the State and that employment is expected to increase over the next 10 years by 22% or 11,860 jobs. Particularly strong growth is expected in areas providing services to elderly residents such as Services for the Elderly, and Continuing Care Retirement Communities. In terms of R&D related industries, the employment in Vermont is very low, including approximately 230 employees working on research and development in the Physical, Engineering, and Life Sciences (NAICS 541712) industry and less than 50 employees in the Research and Development in Biotechnology (NAICS541711) industry.

There are many other areas of the United States that are focused on developing their own Life Sciences cluster that have spent many years and resources devoted to cultivating the right climate to support a Life Sciences cluster such as Greater Boston and the DC area. In order for Vermont to capitalize on similar growth in Life Sciences there will need to be increased research and development funding, coordination with universities/colleges, workforce development and focused efforts coming from the State. The Greater Boston area has the combination to be truly successful in developing this cluster with a particular strength in the quality of the workforce that is available and the funding from the National Institute of Health (NIH) for research and development. ⁴¹

In terms of venture capital and research and development, besides the University of Vermont, the State has not been attracting significant amounts of money and or research when it comes to the Health Care industry. The health care company Mobile Medical International received a venture capital investment of \$4.1 million between 2005 and 2010. ⁴² In 2009, Vermont's universities and colleges conducted \$125 million in total research and development. Of that amount, \$103 million, or 82% was in life sciences. The R&D performed was driven by R&D at the University of Vermont which has a medical school. Compared to other states however, Vermont does not have a significant amount of R&D coming from the private sector, which is a negative sign for industry innovation and commercialization efforts.

Target Sector & Cluster Analysis – Appendix D

⁴¹ http://www.us.am.joneslanglasalle.com/ResearchLevel1/Life%20Sciences%20Cluster%20Report_Global_2012.pd

¹ ⁴² Ibid

University & College R&D by Field of Study as a % of Total - 2009								
	Environmental		Math and computer	Physical		Social	Other	
	sciences	Life sciences	sciences	sciences	Psychology	sciences	Sciences	Engineering
US	5.35%	59.69%	3.91%	7.82%	1.78%	3.78%	1.93%	15.75%
Vermont	1.17%	82.00%	0.86%	2.30%	1.72%	0.18%	3.89%	7.88%
New England	8.72%	55.64%	3.60%	8.71%	2.20%	3.15%	3.10%	14.88%

Medical Device Manufacturing (NAICS 33451) is discussed further in the Manufacturing and Aerospace Cluster section of this report but it also fits into the Health Care and Life Sciences Cluster as these types of manufacturing facilities will typically locate in areas where there is a cluster of health care related companies, industries, hospitals, and research and development occurring. These types of assets do exist in Vermont, but a majority of them are in the Burlington area making that the area where new companies would likely chose to locate.

Examples of companies operating in this cluster include Southwester Vermont Medical Center, Ascutney Hospital, Brattleboro Retreat, Grace Cottage, Genesis Healthcare Corporation, Applied Research Associates, Verterre Group, New Chapter, and Green Mountain Antibodies.

Insights from Previous Reports

The following is an overview of information from a review of previous reports as they relate to the Health Care and Life Sciences Cluster in Vermont.

One aspect that came up a number of times in the review of previous reports, as well as in the economic base analysis conducted for the CEDS, was the aging population of the State and the numerous impacts that will have. Vermont is one of the oldest states in the United States and with that comes increased demand for health care services, personal aides, hospitals, rehab centers, and other industries, all of which are showing increased employment in the coming years.

Information Technology Cluster

Cluster Description

The Information Technology Cluster (also referred to as the "IT Cluster") includes industries involved in the design, development, support, and management of hardware, software, multimedia, and systems integration services. For this analysis, the IT Cluster does not include hardware, semiconductor, or electronic components manufacturing; those industries are assessed as part of the Manufacturing Cluster. Industries within the IT Cluster are expected to see growth over the next 10 years and IT will become more important in every aspect of the global and Vermont economy. For example, the increased automation of operations in the Forestry and Wood Products Cluster will result in increased demand for those with IT skills to be able to create, manage, and maintain the equipment and lands. The IT Cluster is one that crosses through many aspects of the economy and is, therefore, important to Vermont.

The following is the list of the industries included in this analysis of the Information Technology Cluster.

Information Technology Cluster					
NAICS Code	Description				
511210	Software Publishers				
517110	Wired Telecommunications Carriers				
517210	Wireless Telecommunications Carriers (except Satellite)				
517410	Satellite Telecommunications				

517911	Telecommunications Resellers
517919	All Other Telecommunications
518210	Data Processing, Hosting, and Related Services
519110	News Syndicates
519120	Libraries and Archives
519130	Internet Publishing and Broadcasting and Web Search Portals
519190	All Other Information Services
541511	Custom Computer Programming Services
541512	Computer Systems Design Services
541513	Computer Facilities Management Services
541519	Other Computer Related Services
541618	Other Management Consulting Services
541720	Research and Development in the Social Sciences and Humanities

Summary and Conclusions

Assets:

- Overall good fit with Vermont in terms of supporting small independent businesses, entrepreneurs, contractors, and consultants
- Low barriers to entry low capital requirements
- Can be influenced by quality of place but also requires access to broadband and other talent (for networks)
- Vermont's strengths based on employment in Custom Computer Programming Services and **Computer Systems Design Services**
- Vermont's occupation strengths are based on current size and projected growth, include Computer User Support Specialists, Software Developers (Applications), Network and Computer Systems Administrators, Software Developers (Systems Software), Telecommunications Line Installers and Repairers, and Computer Systems Analysts
- Higher than average wages with higher education degrees (associate's and beyond) typically required
- Continued growth nationally and globally projected in IT markets The IT consulting industry is expected to grow further by 1.2% to reach \$337.0 billion in 2013 and global and national growth projected in IT Security, Software and Application Development, Enterprise Software, and Cloud Computing
- IT intersects with other sectors including telehealth, health records, and business analysts
- Recent success in accessing venture capital media, electronic, internet, and ecommerce companies in Vermont received 19.3 million in venture capital between 2005 and 2012⁴³
- Significant improvement in the availability and quality of broadband throughout the state through ConnectVT, thus making IT businesses, contractors, and entrepreneurs more likely to start and expand
- The State has a program to provide direct incentives for students in STEM to locate and remain in Vermont
- Vermont Center for Emerging Technologies (VCET) provides support (start-up, incubation acceleration) specifically for the software and information technology industry; however the

⁴³ Ibid

- program is relatively small and concentrated in Chittenden County (there is need for expansion of funding and services)
- IT and high tech goods and services are export oriented (i.e. bring new wealth into the state)
- Several recent (2009 and beyond) initiatives have assessed information technology and economic development related issues and have developed detailed goals, findings, and recommendations. These include ConnectVT, Vermont's Commission on the Future of Economic Development, a 2012-2013 Legislative Committee on Enhancing Vermont's Software and Information Technology and a 2102 industry initiative lead by the Vermont Technology Alliance, Vermont Technology Council, and Vermont Bioscience Alliance. As a whole, these initiatives provide excellent guidance for a focus on IT Cluster strategies and, in particular, the Legislative Committee on Enhancing Vermont's Software and Information Technology provides specific recommendations for the State, providing a solid action agenda for growing the cluster.

Challenges:

- Most occupations require at least an associate's degree, many require bachelor's and beyond
- Finding qualified workforce
- Many programs require additional state funding priorities for this cluster must compete with those in other clusters and with other state programs and services
- More opportunities needed for preparing K–12 students with critical skills needed for college level study and career preparation in the fields of computer science and hardware/software engineering
- A Made in Vermont brand of quality in rural agricultural and recreation has not translated to quality and opportunities in tech sectors

Data Findings

In 2013, total employment in the IT Cluster in Vermont totaled 6,362. This represented 1.78% of all employment in Vermont in 2013⁴⁴.

In 2012, the latest year for which establishment data is available, there were 878 total establishments in the IT Cluster in Vermont representing 3.56% of all establishments in the state. The average establishment size in the IT Cluster was 7.2 employees per establishment compared to an average establishment size of 14.5 in Vermont for all industries.

In terms of industry concentration as measured by national location quotient, only Libraries and Archives (3.15) and Custom Computer Programming Services (1.15) had concentrations above the national average.

Between 2008 and 2013, the IT Cluster lost 6% of employment (389 jobs). Losses were driven by Data Processing, Hosting, and Related Services (438 jobs lost) and Wireless Telecommunications Carriers (except Satellite) (93 jobs lost). Custom Computer Programming Services (256 jobs gained) and Computer Systems Design Services (102 jobs gained) led IT subsectors with job increases. Overall, the IT

⁴⁴Note: IT is a cluster in which employment data typically understates the job impacts across all sectors. For example, 2013 employment in the IT Cluster as defined here was 6,362. This represents all employment within the IT industries defined by the NAICS codes. However, across the whole Vermont economy, in 2013 there were 7,473 IT and IT-intensive related occupations. This represents the IT occupations of persons employed in all Vermont industries (all NAICS codes). So when examining the IT Cluster it is important to consider IT and IT related occupations as well as employment in IT industries as employment alone understates the importance of IT.

Custer is projected to increase employment by 17% (1,117 jobs) between 2013 and 2023. Employment increases are projected to be led by Custom Computer Programming Services (607 jobs to be gained) and Computer Systems Design Services (584 jobs to be gained).

In 2013, top occupations in the IT Cluster include Computer User Support Specialists (484 jobs), Software Developers, Applications (448 jobs), Network and Computer Systems Administrators, (364 jobs), Software Developers, Systems Software, (332 jobs), and Telecommunications Line Installers and Repairers (304 jobs).

Between 2013 and 2023, occupation growth in the IT Cluster is projected to be driven by Software Developers, Applications (167 jobs to be gained), Software Developers, Systems Software (140 jobs to be gained), Computer User Support Specialists (85 jobs to be gained), Computer Systems Analysts (67 jobs to be gained), and Network and Computer Systems Administrators (53 jobs to be gained).

Wages in the IT Cluster are typically higher than wages in all industries in Vermont, which in 2013 were \$38,401 on average annually. In fact, all but three of the top 20 occupations in the IT Cluster had higher wages than the average for Vermont as a whole in 2013. Most occupations in the IT Cluster require at least an associate's degree and many require bachelors and beyond.

Existing Conditions

	Information Technology Cluster -	Current I	Employmen	t and Esta	blishment	:S	
NAICS	Description	2013 Jobs	% of Cluster	% of VT Jobs	# of Est.	Emp. per Est.	LQ
541511	Custom Computer Programming Services	2,198	34.55%	0.62%	331	7	1.15
541512	Computer Systems Design Services	1,422	22.35%	0.40%	210	7	0.70
517110	Wired Telecommunications Carriers	1,188	18.67%	0.33%	103	12	0.86
511210	Software Publishers	297	4.67%	0.08%	34	9	0.43
519120	Libraries and Archives	234	3.68%	0.07%	36	7	3.55
518210	Data Processing, Hosting, and Related Services	205	3.22%	0.06%	31	7	0.33
541618	Other Management Consulting Services	205	3.22%	0.06%	33	6	0.78
519130	Internet Publishing and Broadcasting and Web Search Portals	183	2.88%	0.05%	14	13	0.56
541720	Research and Development in the Social Sciences and Humanities	115	1.81%	0.03%	28	4	0.77
541519	Other Computer Related Services	114	1.79%	0.03%	21	5	0.39
517210	Wireless Telecommunications Carriers (except Satellite)	74	1.16%	0.02%	13	6	0.20
517919	All Other Telecommunications	47	0.74%	0.01%	7	7	0.74
541513	Computer Facilities Management Services	28	0.44%	0.01%	7	4	0.19
517410	Satellite Telecommunications	17	0.27%	0.00%	2	9	0.67
517911	Telecommunications Resellers	15	0.24%	0.00%	4	4	0.08
519110	News Syndicates	13	0.20%	0.00%	1	13	0.44
Informat	ion Technology Cluster Total	6,362	100.00%	1.78%	878	7	

Source: QCEW Employees, Non-QCEW Employees & Self-Employed - EMSI 2013.4 Class of Worker

Note: Industries with fewer than 10 employees not included

Industry Data *Historic 2008-2013*

	Information Technology Cluster - I	Historic Gro	wth		
NAICS	Description	2008 Jobs	2013 Jobs	# Change	% Change
541511	Custom Computer Programming Services	1,942	2,198	256	13%
541512	Computer Systems Design Services	1,320	1,422	102	8%
511210	Software Publishers	254	297	43	17%
517919	All Other Telecommunications	26	47	21	81%
517410	Satellite Telecommunications	<10	17	12	240%
541513	Computer Facilities Management Services	36	28	(8)	-22%
519110	News Syndicates	24	13	(11)	-46%
519120	Libraries and Archives	254	234	(20)	-8%
541720	Research and Development in the Social Sciences and Humanities	138	115	(23)	-17%
541618	Other Management Consulting Services	230	205	(25)	-11%
541519	Other Computer Related Services	162	114	(48)	-30%
519130	Internet Publishing and Broadcasting and Web Search Portals	233	183	(50)	-21%
517911	Telecommunications Resellers	69	15	(54)	-78%
517110	Wired Telecommunications Carriers	1,245	1,188	(57)	-5%
517210	Wireless Telecommunications Carriers (except Satellite)	167	74	(93)	-56%
518210	Data Processing, Hosting, and Related Services	643	205	(438)	-68%
Informati	on Technology Cluster Total	6,751	6,362	(389)	-6%

Source: QCEW Employees, Non-QCEW Employees & Self-Employed - EMSI 2013.4 Class of Worker Note: Industries with fewer than 10 employees in 2008 and 2013 not included. For industries with fewer than 10 employees in only one year, analyst assumes 5 employees for purposes of calculation.

Projected 2013-2023

	Information Technology Cluster - Projected Growth						
NAICS	Description	2013 Jobs	2023 Jobs	# Chang e	% Change		
541511	Custom Computer Programming Services	2,198	2,805	607	28%		
541512	Computer Systems Design Services	1,422	2,006	584	41%		
511210	Software Publishers	297	370	73	25%		
519130	Internet Publishing and Broadcasting and Web Search Portals	183	217	34	19%		
517410	Satellite Telecommunications	17	48	31	182%		
517110	Wired Telecommunications Carriers	1,188	1,212	24	2%		
517919	All Other Telecommunications	47	39	(8)	-17%		

519110	News Syndicates	13	<10	(8)	-62%
517911	Telecommunications Resellers	15	<10	(10)	-67%
541618	Other Management Consulting Services	205	193	(12)	-6%
541720	Research and Development in the Social Sciences and Humanities	115	103	(12)	-10%
541513	Computer Facilities Management Services	28	<10	(23)	-82%
519120	Libraries and Archives	234	209	(25)	-11%
541519	Other Computer Related Services	114	79	(35)	-31%
518210	Data Processing, Hosting, and Related Services	205	169	(36)	-18%
517210	Wireless Telecommunications Carriers (except Satellite)	74	14	(60)	-81%
Information Technology Cluster Total		6,362	7,479	1,117	18%

Source: QCEW Employees, Non-QCEW Employees & Self-Employed - EMSI 2013.4 Class of Worker Note: Industries with fewer than 10 employees in 2013 and 2023 not included. For industries with fewer than 10 employees in only one year, analyst assumes 5 employees for purposes of calculation.

Occupation Data

	Information Technology Clus	ter - Occup	ation Analysis	(20 largest)
SOC	Occupation	2013 Jobs	Annual Wages	Education Required
15-1151	Computer User Support Specialists	484	\$41,980	Associate's degree
15-1132	Software Developers, Applications	448	\$74,300	Bachelor's degree
15-1142	Network and Computer Systems Administrators	364	\$61,240	Bachelor's degree
15-1133	Software Developers, Systems Software	332	\$88,980	Bachelor's degree
49-9052	Telecommunications Line Installers and Repairers	304	\$60,980	Long-term on-the-job training
49-2022	Telecommunications Equipment Installers and Repairers, Except Line Installers	260	\$50,400	Postsecondary non-degree award
15-1131	Computer Programmers	196	\$59,800	Bachelor's degree
43-4051	Customer Service Representatives	193	\$28,980	Short-term on-the-job training
15-1134	Web Developers	175	\$55,160	Bachelor's degree
41-3099	Sales Representatives, Services, All Other	167	\$43,780	Short-term on-the-job training
15-1152	Computer Network Support Specialists	166	\$60,400	Associate's degree
11-3021	Computer and Information Systems Managers	164	\$111,520	Bachelor's or higher degree, plus work experience
15-1121	Computer Systems Analysts	163	\$67,480	Bachelor's degree
13-1161	Market Research Analysts and Marketing Specialists	138	\$47,720	Bachelor's degree
43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	134	\$29,900	Short-term on-the-job training
11-1021	General and Operations Managers	126	\$79,200	Bachelor's or higher degree, plus work experience

43-3031	Bookkeeping, Accounting, and Auditing Clerks	126	\$33,200	Moderate-term on-the-job training
13-2011	Accountants and Auditors	104	\$57,160	Bachelor's degree
41-4011	Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	98	\$71,560	Bachelor's degree
13-1111	Management Analysts	77	\$49,320	Bachelor's or higher degree, plus work experience

Note: Annual wages based on 2,000 hours per

year

Historic 2008-2013

Information Technology Cluster - Historic Occupation Growth (Top 20 Largest Growth)						
SOC	Occupation	2008 Jobs	2013 Jobs	# Change	% Change	
Total	All Cluster Occupations	6,313	5,953	(360)	(6%)	
15-1133	Software Developers, Systems Software	289	332	43	15%	
15-1132	Software Developers, Applications	425	448	23	5%	
15-1151	Computer User Support Specialists	462	484	22	5%	
13-1161	Market Research Analysts and Marketing Specialists	118	138	20	17%	
13-1151	Training and Development Specialists	57	65	8	14%	
41-4011	Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	91	98	7	8%	
17-2061	Computer Hardware Engineers	50	57	7	14%	
15-1142	Network and Computer Systems Administrators	358	364	6	2%	
13-1041	Compliance Officers	34	38	4	12%	
27-1014	Multimedia Artists and Animators	23	26	3	13%	
43-3031	Bookkeeping, Accounting, and Auditing Clerks	124	126	2	2%	
43-6011	Executive Secretaries and Executive Administrative Assistants	71	73	2	3%	
15-1152	Computer Network Support Specialists	165	166	1	1%	
13-2011	Accountants and Auditors	103	104	1	1%	
41-9031	Sales Engineers	40	41	1	3%	
17-3023	Electrical and Electronics Engineering Technicians	37	38	1	3%	
27-3031	Public Relations Specialists	26	27	1	4%	
11-9041	Architectural and Engineering Managers	24	25	1	4%	
17-2071	Electrical Engineers	13	14	1	8%	
11-2021	Marketing Managers	44	44	0	0%	

Source: QCEW Employees, Non-QCEW Employees & Self-Employed - EMSI 2013.4 Class of

Worker

Information Technology Cluster - Projected Occupation Growth (Top 20 Largest Growth)						
SOC	Occupation	2013 Jobs	2023 Jobs	# Change	% Change	
Total	All Cluster Occupations	5,953	7,046	1,093	18%	
15-1132	Software Developers, Applications	448	615	167	37%	
15-1133	Software Developers, Systems Software	332	472	140	42%	
15-1151	Computer User Support Specialists	484	569	85	18%	
15-1121	Computer Systems Analysts	163	230	67	41%	
15-1142	Network and Computer Systems Administrators	364	417	53	15%	
15-1131	Computer Programmers	196	242	46	23%	
13-1161	Market Research Analysts and Marketing Specialists	138	178	40	29%	
11-3021	Computer and Information Systems Managers	164	202	38	23%	
15-1134	Web Developers	175	204	29	17%	
15-1152	Computer Network Support Specialists	166	192	26	16%	
15-1143	Computer Network Architects	75	100	25	33%	
41-4011	Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	98	121	23	23%	
11-1021	General and Operations Managers	126	146	20	16%	
49-2022	Telecommunications Equipment Installers and Repairers, Except Line Installers	260	280	20	8%	
41-3099	Sales Representatives, Services, All Other	167	187	20	12%	
15-1141	Database Administrators	61	79	18	30%	
17-2061	Computer Hardware Engineers	57	74	17	30%	
13-1151	Training and Development Specialists	65	81	16	25%	
43-9061	Office Clerks, General	46	62	16	35%	
43-4051	Customer Service Representatives	193	209	16	8%	

Worker

Market Research

Within the Information Technology sector, additional research was conducted related to IT Consulting (NAICS 54151). IT Consulting is a particular subset of the Information Technology Cluster that provides technical services to clients and includes Custom Computer Programming, Systems Design, Computer Facilities Management, and Other Computer Related Services.

Companies within this sector provide services such as writing, testing, and supporting custom software; planning and designing integrated hardware, software, and communication infrastructure; and on-site management of computer systems and data processing facilities. This industry excludes packaged software publishers and off-site data processing and hosting services. The IT Consulting industry has a location quotient of 0.86 compared to the national average, suggesting the industry is not very concentrated in Vermont compared to the rest of the nation. However, within the sector Custom Computer Programming Services has a location quotient of 1.15 suggesting a higher concentration than the U.S. as a whole.

Due to the low capital requirements of the industry, the majority of operators are small firms and independent contractors. Nationally, between 2008 and 2013, the industry performed well in a challenging economic climate. Rising corporate profit in 2010 triggered new demand for IT Consulting, as many firms looked to improve efficiencies through better computer systems. Growth in integrated systems sales, combined with all-inclusive consulting services, boosted industry profit from 6.6% of revenue in 2008 to 7.5% in 2013. These factors contributed to an annualized 2.2% growth rate in industry revenue in the five years through 2013. The IT Consulting industry is expected to grow further by 1.2% to reach \$337.0 billion in 2013.

As the economy recovers, improving business sentiment and corporate profit levels will further drive industry performance. In the five years to 2018, industry revenue is expected to grow an annualized 2.9% to \$389.4 billion. Increasing merger and acquisition activity in other industries will spur demand for IT consultants and, with more consolidations, companies will require assistance in the integration of accounting, information storage, and other systems. Additionally, profit is projected to grow only slightly during this time as major companies continue to shift the balance of their services toward higher value-added offerings; however, this will be somewhat mitigated by increasing price competition.

Example companies in Vermont include: General Electric Company, iTech, Allscripts, microDATA GIS, and Vertek Corporation. Many of the companies in this industry with the highest levels of employment are located in the Chittenden County/Burlington region of the state.

Vermont companies within the broader categories of media, electronic, internet, and Ecommerce have had recent success at obtaining venture capital, having received 19.3 million in venture capital between 2005 and 2012.⁴⁵

Additional market research conducted into specific IT markets reveals continued growth nationally and globally.

IT Security

• IT security spending is projected to reach \$30.1 billion in 2017⁴⁶ - "Security remains a priority for businesses and though they may be slashing their IT budgets due to tough economic conditions, investment in security solutions is less affected than other infrastructure areas, such as networking and unified communications. Through to 2017 Canalys expects the worldwide IT security market to grow at a compound annual rate of 6.6%, to reach \$30.1 billion in 2017."

Category	2012	2013 (forecast)	2017 (forecast)	CAGR 2012-2017
Total	5,969.5	6,443.6	8,500.3	7.3%
Network security	2,314.2	2,529.5	3,357.1	7.7%
Content security	2,354.7	2,509.1	3,263.5	6.7%
Security management	1,300.6	1,405.0	1,879.6	7.6%

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⁴⁵ Ibid

⁴⁶ Canalys, August 2013, www.canalys.com/newsroom/it-security-spend-reach-301-billion-2017

•	Gartner Says Worldwide Security Market to Grow 8.7% in 2013 - As companies continue to expand the technologies they use to improve their overall security, the worldwide security technology and services market is forecast to reach \$67.2 billion in 2013, up 8.7% from \$61.8 billion in 2012, according to Gartner, Inc. The market is expected to grow to more than \$86 billion in 2016.

Enterprise Software, Cloud Computing

- GLOBAL ENTERPRISE SOFTWARE MARKET REACHES \$179BN IN H1⁴⁷ "Enterprises are considering new opportunities to drive new and improved products and services by leveraging information. Global software market rose 5.5% to \$179bn during the initial six months of 2013, which was mainly driven by big data/analytics, content applications, and system software, according to a new IDC report. IDC Worldwide Software, Services and Executive Advisory Research senior vice president Henry Morris said that enterprises are seeing new opportunities to drive new and improved products and services by leveraging information. Therefore, it stands to reason that software to manage, access, and share information (structured and unstructured) continues to be a priority for competing in today's economy and a driver of software market growth."
- GLOBAL PAAS MARKET TO REACH \$6.94BN IN 2018⁴⁸ "Market is expected to grow at compound annual growth rate (CAGR) of 32.54%. The global platform as a service (PaaS) market is expected to reach \$6.94bn in 2018 from \$1.28bn in 2013, according to a report by the MarketsandMarkets. Factors in application development process such as agility, scalability, limited need for expertise, easy deployment, and reduced cost and development time are expected to drive the PaaS market. According to the report, North America is expected to continue to be the biggest market for PaaS applications. PaaS has been the smallest market among the cloud computing segments but the market is now growing faster in terms of revenue."
- Gartner Says Cloud-Based Security Services Market to Reach \$2.1 Billion in 2013⁴⁹ "The cloud-based security services market will be worth \$2.1 billion in 2013, rising to \$3.1 billion in 2015, according to Gartner, Inc. Gartner said that growth in cloud-based security will remain strong, but revenue opportunities will vary."
- Gartner Says Cloud Computing Will Become the Bulk of New IT Spend by 2016⁵⁰ "The use of cloud computing is growing, and by 2016 this growth will increase to become the bulk of new IT spend, according to Gartner, Inc. 2016 will be a defining year for cloud as private cloud begins to give way to hybrid cloud, and nearly half of large enterprises will have hybrid cloud deployments by the end of 2017."
- Gartner Says Worldwide Enterprise IT Spending is Forecast to Grow 2.5% in 2013⁵¹ "Worldwide enterprise IT spending is forecast to total \$2.679 trillion in 2013, a 2.5 percent increase of projected 2012 spending of \$2.603 trillion, according to Gartner, Inc. Banking, communications, media and services (CMS) and manufacturing are expected to offer the largest volume of growth opportunities through 2016."

⁴⁷CBR, October 31, 2013, http://www.cbronline.com/news/tech/software/enterprise-apps/global-enterprise-software-market-reaches-179bn-in-h1-311013

⁴⁸CBR , February 12, 2013, www.cbronline.com/news/tech/cio-agenda/the-boardroom/global-paas-market-to-reach-694bn-in-2018-report-120213

⁴⁹Gartner, Inc., October 31, 2013, <u>www.gartner.com/newsroom/id/2616115</u>

⁵⁰Gartner, Inc., October 24, 2013, http://www.gartner.com/newsroom/id/2613015

⁵¹Gartner, Inc., November 15, 2012, www.gartner.com/newsroom/id/2238915

Software and Application Development

- GLOBAL DIGITAL COMMERCE APPLICATIONS MARKET TO REACH \$4.1BN IN 2017⁵² "They have turned out to be one of the top growing segments in the overall enterprise applications software market, IDC reported. The digital commerce applications market is projected to grow at 18.8% compound annual growth rate (CAGR) and reach \$4.1bn by the end of 2017, a new IDC report revealed. The research firm also anticipates that the market for digital commerce applications would show signs of strong growth over the following five years as they have turned out to be one of the top growing segments in the overall enterprise applications software market."
- WORLDWIDE SOFTWARE MARKET FORECAST TO GROW MODESTLY THROUGH 2017⁵³ "Compound annual growth rate (CAGR) for the 2012-2017 period is 6.3%. 2012 saw the worldwide software market rise 3.6% year-on-year, as the growth rate reduced by less than half when compared to 2010 and 2011. International Data Corporation (IDC), which released these figures in its latest forecast from the Worldwide Semiannual Software Tracker, opines that these results are the beginning of a more modest period of growth. The research firm forecasts that the market is expected to grow at a compound annual growth rate (CAGR) 6.3% during 2012-2017, while in 2013 it will grow 5.7%."
- Gartner Says Worldwide Business Intelligence Software Revenue to Grow 7% in 2013⁵⁴ "Worldwide business intelligence (BI) software revenue will reach \$13.8 billion in 2013, a 7 percent increase from 2012, according to Gartner, Inc. The market is forecast to reach \$17.1 billion by 2016."
- Small Businesses Dominate Mobile App Market⁵⁵ "The emergence of the \$20 billion mobile applications market is not only revolutionizing the software industry, it's also having a profound impact on the national economy as well, a new study found. With smartphones and tablets providing new platforms for software developers, an entire new class of software entrepreneurs has emerged. And the majority of these new players are small businesses. Small businesses dominate across all top apps categories games, education, productivity and business. The growth of startups and new businesses to support this mobile apps ecosystem, which is predicted to top \$100 billion by 2015, has also led to significant job creation during an otherwise troubled economic period, the ACT survey found. Research conducted by ACT and Microsoft's TechNet shows that the app economy has created between 400,000 and 600,000 jobs."
- GLOBAL TECH MARKET TO GROW BY 5.4% IN 2013 AND 6.7% IN 2014⁵⁶ The U.S. tech market will lead with 7.5% growth in 2013, while Europe will lag with just 0.8% growth in local currencies. Software and IT outsourcing will do best in 2013; software and computer equipment will lead in 2014. Analytics, big data, mobility, collaboration, and cloud continue to drive tech buying, especially in developed markets.

⁵²CBR, December 20, 2013, www.cbronline.com/news/tech/software/appdev/global-digital-commerce-applications-market-to-reach-41bn-in-2017-191213-4149104

⁵³CBR May 24, 2013, http://www.cbronline.com/news/tech/software/appdev/worldwide-software-market-forecast-to-grow-modestly-through-2017-240513

⁵⁴Gartner, Inc., February 19, 2013, http://www.gartner.com/newsroom/id/2340216

⁵⁵BusinessNewsDaily, July 24, 2012, http://mashable.com/2012/07/24/small-business-mobile-app/

⁵⁶Forrester Research, January 3, 2013, http://blogs.forrester.com/andrew_bartels/13-01-03-global tech market to grow by 54 in 2013 and 67 in 2014

Insights from Previous Reports

The following is an overview of information from a review of previous reports as they relate to the IT Cluster in Vermont.

Growth in the IT Cluster requires access to high quality, reasonably priced broadband infrastructure and services. Vermont has a telecommunication plan⁵⁷ that lays out goals and strategies for increasing broadband capacity and adoption throughout the state for residents and businesses. In January 2011, Governor Shumlin launched a specific initiative to achieve statewide connectivity called ConnectVT. Two specific goals directly relate to business competiveness in the IT Cluster:

- "The state where business and agricultural sectors locate, expand, and thrive in a global marketplace for goods and services
- It is not only the speed of connectivity; it is the quality of our telecommunications services that will be a differentiating factor for Vermont on a global landscape⁵⁸"

ConnectVT was launched in response to a lack of capacity and adoption of broadband in the state. As stated in the report:

"There are overarching economic challenges to the business case for sustainable broadband infrastructure in Vermont and strategies are necessary to overcome these challenges. On the demand side, sparse population and slow adoption in newly served areas provide lower incentive for private investment. On the supply side, Vermont's topography and the high costs of backhaul and tower construction are impediments to service deployment. An April 2010 survey report indicates that 18% of Vermont businesses report that they do not have broadband and half of those businesses report that they don't have it because it is not available at their location." ⁵⁹

To address these challenges, the plan laid out specific strategies, including:60

- Leverage electric utility telecommunications infrastructure planned to lower the cost of backhaul and increase geographic availability of broadband.
- Aggregate institutional demand and organize connections to institutions, broadband providers, and cell sites.
- Subsidize construction of key telecommunication infrastructure if it is not economically available from existing providers.
- Continue expeditious permitting policies to improve affordability and availability of broadband deployment.

ConnectVT has made an impact. Since the initiative, Vermont:61

- Ranks 5th in the United States for average speed of connection, at 6.7 Mbps. This represents growth of 29% year-to-year, 2010 to 2011. New England neighbor Rhode Island ranks 1st, at 8.2 Mbps;
- Ranks 8th in the United States for adoption at High Broadband speed, with 51% of connections at greater than 5 Mbps;

59 Ibid

⁵⁷Vermont Telecommunications Plan 2011: Broadband, May 2011, Vermont Department of Public Service; http://publicservice.vermont.gov/sites/psd/files/Pubs_Plans_Reports/State_Plans/Telecom_Plan/2011TelecommunicationsPlan.pdf

⁵⁸ Ibid

⁶⁰ Ibid

⁶¹ Ibid

- Ranks 7th in the United States for average peak speed of connection, at 24.7 Mbps, an increase of 36% year-to-year, 2010 to 2011; and
- Made 8,000 connections between February 2011 and March 2012.

The importance of digital infrastructure to economic development and IT business is also supported through Vermont's Commission on the Future of Economic Development. "Vermont invests in its digital infrastructure as the foundation for all economic development" and Vermont will "conduct statewide mapping of locations on which construction and operation of infrastructure is permitted use; leverage VT digital infrastructure and develop innovative polices to attract e-businesses and supports existing." ⁶²

Vermont has also recently developed specific assessments and recommendations to support the growth of IT and high tech businesses through the work of a 2012-2013 Legislative Committee on Enhancing Vermont's Software and Information Technology and a 2102 industry initiative lead by the Vermont Technology Alliance, Vermont Technology Council, and Vermont Bioscience Alliance.

The Committee on Enhancing Vermont's Software and Information Technology Economy was charged with studying "...ways to encourage the continued growth of investment and job creation in the software and information technology sector; to develop strategies to assist software and new media entrepreneurs to start new businesses in Vermont and to foster growth among established software businesses; to review workforce training and education opportunities as they apply to the software and information technology sector; and to review and make recommendations regarding the impact of current state programs and regulations, including existing economic incentives and current taxation policies." The Committee identified four key areas in which Vermont state government can take important steps to enhance the software and IT economy, including Education, Marketing, Finance, and Collaboration and Networking. Recommendations include:⁶⁴

- "The state's STEM incentive program is working successfully and should be continued and expanded.
- Vermont's K-12 education system does not provide adequate opportunities for students to learn critical skills that are prerequisites for college level study and career preparation in the fields of computer science and hardware/software engineering.
- State education policy, as it relates to computer science and technology, be amended and reorganized to differentiate between distinct technology programs of study: basic computer skills (e.g., use of word processing, spreadsheet, and communication applications) provide critical skills that nearly all students should possess, regardless of career aspirations; IT maintenance (e.g., hardware/software/networking installation and support) a program of study most relevant for students on a vocational/two-year degree path; and software/hardware engineering a program of study that supplements college preparatory math and science courses with theoretical and applied education that is specific to software and hardware engineering (e.g., logic, programming theory, and applied software development)
- The state take additional steps to promote its existing internship programs in the technology and scientific fields, and to expand these programs to include teachers and guidance counselors.
- Vermont's tourism industry promotions emphasize Vermont's rural agricultural and recreation image mostly to the exclusion of Vermont's technology sector, which reinforces a misconception that Vermont is not "tech friendly." The Committee recommends that the Department of

⁶²Report of the Commission on the Future of Economic Development, April 2009; http://www.snellingcenter.org/cfed/reports-and-information/

 ⁶³Enhancing Vermont's Software and Information Technology Economy Committee, January 15, 2013, State of Vermont, The Committee on Enhancing Vermont's Software and Information Technology Economy,
 www.leg.state.vt.us/reports/2013externalreports/285638.pdf
 ⁶⁴ Ibid

Tourism and Marketing promote Vermont's technology industry and opportunities to both instate and out-of-state audiences. The Committee further recommends that the Department of Tourism and Marketing co-promote Vermont's technology industry with other marketing efforts.

- Adjust language in state contracts so that the state shares intellectual property (IP) rights
 developed under a state contract with the contractor if the contractor is a Vermont-based
 company, ensuring the state has the right to use the IP and the contractor has the right to
 develop it commercially.
- The state's procurement process be improved to offer more streamlined opportunities for Vermont businesses to conduct business with the state.
- The VEGI program be modified to make it more accessible and less burdensome to use for smaller technology companies, which could be accomplished by simplifying the documentation required under the "but-for" clause.
- Funding for first-loss funding and loan guarantees through VEDA be replenished.
- State law be changed to provide preferential treatment for capital gains that are reinvested in Vermont technology companies.
- State law be amended to eliminate the Business Entity Tax for the first three years of the life of the business organized as a pass-through entity.
- Vermont statutes be amended to provide a clear safe harbor provision for the potential employee misclassification of independent contractors in the software and IT sectors.
- Vermont Center for Emerging Technologies (VCET) is working well and provides high value for Vermont's software and information technology industry.
- Increase funding and provide other appropriate support to Vermont-based technology organizations, industry networking and trade shows, and Angel Investor networking.
- State agencies take necessary steps to make state-collected data more readily available for consumption in machine-readable format.
- The state authorize one property tax exemption to be awarded to a recipient designated by the regional development corporation in each region to support a regional incubator space during the recipient's first five years of operation."

In 2012, an industry initiative led by the Vermont Technology Alliance, Vermont Technology Council, and Vermont Bioscience Alliance found and recommended:⁶⁵

- "The majority of the high-tech companies in Vermont earn 90% or more of their revenue from out-of-state customers.
- Tech companies in Vermont have a hard time finding business financing. The state should do
 more to help local financial institutions recognize the benefits of investing in Vermont's
 knowledge-based businesses.
- Tech companies need educated employees. The vtTA and the VTC would like to see increased communication between Vermont's tech companies and its high schools and colleges. The state's new science, technology, engineering and math initiative, which offers a financial incentive for recent graduates who accept STEM related jobs at Vermont companies, is a step in the right direction. The VTC and vtTA members want to see an increased focus, not just on science and math, but on graduating students who can write and reason, and work collaboratively to solve problems."

⁶⁵Tapping Tech 2.0 - Transforming Vermont's Economy, March 2012, Vermont Technology Alliance, Vermont Technology Council, Vermont Bioscience Alliance, www.tappingtech.org/tappingtech2.pdf

Manufacturing and Aerospace Cluster

Cluster Description

The Manufacturing and Aerospace Cluster is one that is being pursued by the State as a targeted industry for future growth. The State has even created the Vermont Chamber's Aerospace and Aviation Association (VAAA) to focus on the development and support of the aerospace industry. The VAAA believes that there is an emerging cluster of high-growth industries supporting the aerospace and aviation industry including those involved in precision machining, plastics & polymers, metal fabrication & welding, electronics and others. ⁶⁶

Manufacturing jobs, while perhaps physically demanding, can be well paying and steady work that is attractive to communities looking to improve the local economy and create new opportunities. One challenge that is facing the manufacturing industry throughout the United States is the ability to find and retain a trained/trainable workforce. For Vermont companies, a particular challenge is being able to fill the many positions vacated by retiring workers with skilled younger candidates. A review of the *Strategic Industries in the Northeast Kingdom* report highlighted the issue in the statement "For manufacturing companies, there is a need for customized training programs to improve the skill sets of existing workers as well as enlarge the set of available workers. Delivery of such training programs for manufacturers, however, is often unavailable in rural areas like the Northeast Kingdom." This is an issue being faced by communities all across the Northeast, as the younger generation focuses on higher paying careers outside of manufacturing, in part because of the reputation of the hard work associated with manufacturing jobs.

The following table contains a list of the industries included in this analysis of the Manufacturing and Aerospace Cluster. For this section, excluded from manufacturing is the manufacturing of non-durable goods. In particular excluded from this section is the manufacturing of food and food related products. They are included in their own section on the report in the section labeled "Food Production and Value Added Processing".

Manufacturing and Aerospace Cluster				
NAICS Code	Description			
332115	Crown and Closure Manufacturing			
332116	Metal Stamping			
332117	Powder Metallurgy Part Manufacturing			
332211	Cutlery and Flatware (except Precious) Manufacturing			
332212	Hand and Edge Tool Manufacturing			
332213	Saw Blade and Handsaw Manufacturing			
332214	Kitchen Utensil, Pot, and Pan Manufacturing			
332311	Prefabricated Metal Building and Component Manufacturing			
332312	Fabricated Structural Metal Manufacturing			
332313	Plate Work Manufacturing			
332321	Metal Window and Door Manufacturing			
332322	Sheet Metal Work Manufacturing			
332323	Ornamental and Architectural Metal Work Manufacturing			
332410	Power Boiler and Heat Exchanger Manufacturing			
332420	Metal Tank (Heavy Gauge) Manufacturing			
332431	Metal Can Manufacturing			
332439	Other Metal Container Manufacturing			

⁶⁶ http://www.vtchamber.com/programs/vt aerospace-aviation.aspx

332510	Hardware Manufacturing
332611	Spring (Heavy Gauge) Manufacturing
332612	Spring (Light Gauge) Manufacturing
332618	Other Fabricated Wire Product Manufacturing
332710	Machine Shops
332721	Precision Turned Product Manufacturing
332722	Bolt, Nut, Screw, Rivet, and Washer Manufacturing
332811	Metal Heat Treating
332812	Metal Coating, Engraving (except Jewelry and Silverware), and Allied Services to Manufacturers
332813	Electroplating, Plating, Polishing, Anodizing, and Coloring
332911	Industrial Valve Manufacturing
332912	Fluid Power Valve and Hose Fitting Manufacturing
332913	Plumbing Fixture Fitting and Trim Manufacturing
332919	Other Metal Valve and Pipe Fitting Manufacturing
332991	Ball and Roller Bearing Manufacturing
332996	Fabricated Pipe and Pipe Fitting Manufacturing
332997	Industrial Pattern Manufacturing
332998	Enameled Iron and Metal Sanitary Ware Manufacturing
332999	All Other Miscellaneous Fabricated Metal Product Manufacturing
333111	Farm Machinery and Equipment Manufacturing
333112	Lawn and Garden Tractor and Home Lawn and Garden Equipment Manufacturing
333120	Construction Machinery Manufacturing
333131	Mining Machinery and Equipment Manufacturing
333132	Oil and Gas Field Machinery and Equipment Manufacturing
333210	Sawmill and Woodworking Machinery Manufacturing
333220	Plastics and Rubber Industry Machinery Manufacturing
333291	Paper Industry Machinery Manufacturing
333292	Textile Machinery Manufacturing
333293	Printing Machinery and Equipment Manufacturing
333294	Food Product Machinery Manufacturing
333295	Semiconductor Machinery Manufacturing
333298	All Other Industrial Machinery Manufacturing
333311	Automatic Vending Machine Manufacturing
333312	Commercial Laundry, Dry-cleaning, and Pressing Machine Manufacturing
333313	Office Machinery Manufacturing
333314	Optical Instrument and Lens Manufacturing
333315	Photographic and Photocopying Equipment Manufacturing
333319	Other Commercial and Service Industry Machinery Manufacturing
333411	Air Purification Equipment Manufacturing
333412	Industrial and Commercial Fan and Blower Manufacturing
333414	Heating Equipment (except Warm Air Furnaces) Manufacturing
333415	Air-Conditioning and Warm Air Heating Equipment and Commercial and Industrial Refrigeration Equipment Manufacturing
333511	Industrial Mold Manufacturing
333512	Machine Tool (Metal Cutting Types) Manufacturing
333513	Machine Tool (Metal Forming Types) Manufacturing
333514	Special Die and Tool, Die Set, Jig, and Fixture Manufacturing
333515	Cutting Tool and Machine Tool Accessory Manufacturing
333516	Rolling Mill Machinery and Equipment Manufacturing
333518	Other Metalworking Machinery Manufacturing

333611	Turbine and Turbine Generator Set Units Manufacturing
333612	Speed Changer, Industrial High-Speed Drive, and Gear Manufacturing
333613	Mechanical Power Transmission Equipment Manufacturing
333618	Other Engine Equipment Manufacturing
333911	Pump and Pumping Equipment Manufacturing
333912	Air and Gas Compressor Manufacturing
333913	Measuring and Dispensing Pump Manufacturing
333921	Elevator and Moving Stairway Manufacturing
333922	Conveyor and Conveying Equipment Manufacturing
333923	Overhead Traveling Crane, Hoist, and Monorail System Manufacturing
333924	Industrial Truck, Tractor, Trailer, and Stacker Machinery Manufacturing
333991	Power-Driven Hand tool Manufacturing
333992	Welding and Soldering Equipment Manufacturing
333993	Packaging Machinery Manufacturing
333994	Industrial Process Furnace and Oven Manufacturing
333995	Fluid Power Cylinder and Actuator Manufacturing
333996	Fluid Power Pump and Motor Manufacturing
333997	Scale and Balance Manufacturing
333999	All Other Miscellaneous General Purpose Machinery Manufacturing
334111	Electronic Computer Manufacturing
334112	Computer Storage Device Manufacturing
334113	Computer Terminal Manufacturing
334119	Other Computer Peripheral Equipment Manufacturing
334210	Telephone Apparatus Manufacturing
334220	Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing
334290	Other Communications Equipment Manufacturing
334310	Audio and Video Equipment Manufacturing
334411	Electron Tube Manufacturing
334412	Bare Printed Circuit Board Manufacturing
334413	Semiconductor and Related Device Manufacturing
334414	Electronic Capacitor Manufacturing
334415	Electronic Resistor Manufacturing
334416	Electronic Coil, Transformer, and Other Inductor Manufacturing
334417	Electronic Connector Manufacturing
334418	Printed Circuit Assembly (Electronic Assembly) Manufacturing
334419	Other Electronic Component Manufacturing
334510	Electromedical and Electrotherapeutic Apparatus Manufacturing
334511	Search, Detection, Navigation, Guidance, Aeronautical, and Nautical System and Instrument Manufacturing
334512	Automatic Environmental Control Manufacturing for Residential, Commercial, and Appliance Use
334513	Instruments and Related Products Manufacturing for Measuring, Displaying, and Controlling Industrial Process Variables
334514	Totalizing Fluid Meter and Counting Device Manufacturing
334515	Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals
334516	Analytical Laboratory Instrument Manufacturing
334517	Irradiation Apparatus Manufacturing
334518	Watch, Clock, and Part Manufacturing
334519	Other Measuring and Controlling Device Manufacturing
334611	Software Reproducing

334612	Prerecorded Compact Disc (except Software), Tape, and Record Reproducing
334613	Magnetic and Optical Recording Media Manufacturing
335110	Electric Lamp Bulb and Part Manufacturing
335121	Residential Electric Lighting Fixture Manufacturing
335122	Commercial, Industrial, and Institutional Electric Lighting Fixture Manufacturing
335129	Other Lighting Equipment Manufacturing
335211	Electric Housewares and Household Fan Manufacturing
335212	Household Vacuum Cleaner Manufacturing
335221	Household Cooking Appliance Manufacturing
335222	Household Refrigerator and Home Freezer Manufacturing
335224	Household Laundry Equipment Manufacturing
335228	Other Major Household Appliance Manufacturing
335311	Power, Distribution, and Specialty Transformer Manufacturing
335312	Motor and Generator Manufacturing
335313	Switchgear and Switchboard Apparatus Manufacturing
335314	Relay and Industrial Control Manufacturing
335911	Storage Battery Manufacturing
335912	Primary Battery Manufacturing
335921	Fiber Optic Cable Manufacturing
335929	Other Communication and Energy Wire Manufacturing
335931	Current-Carrying Wiring Device Manufacturing
335932	Noncurrent-Carrying Wiring Device Manufacturing
335991	Carbon and Graphite Product Manufacturing
335999	All Other Miscellaneous Electrical Equipment and Component Manufacturing
336111	Automobile Manufacturing
336112	Light Truck and Utility Vehicle Manufacturing
336120	Heavy Duty Truck Manufacturing
336211	Motor Vehicle Body Manufacturing
336212	Truck Trailer Manufacturing
336213	Motor Home Manufacturing
336214	Travel Trailer and Camper Manufacturing
336311	Carburetor, Piston, Piston Ring, and Valve Manufacturing
336312	Gasoline Engine and Engine Parts Manufacturing
336321	Vehicular Lighting Equipment Manufacturing
336322	Other Motor Vehicle Electrical and Electronic Equipment Manufacturing
336330	Motor Vehicle Steering and Suspension Components (except Spring) Manufacturing
336340	Motor Vehicle Brake System Manufacturing
336350	Motor Vehicle Transmission and Power Train Parts Manufacturing
336360	Motor Vehicle Seating and Interior Trim Manufacturing
336370	Motor Vehicle Metal Stamping
336391	Motor Vehicle Air-Conditioning Manufacturing
336399	All Other Motor Vehicle Parts Manufacturing
336411	Aircraft Manufacturing
336412	Aircraft Engine and Engine Parts Manufacturing
336413	Other Aircraft Parts and Auxiliary Equipment Manufacturing
336414	Guided Missile and Space Vehicle Manufacturing
336415	Guided Missile and Space Vehicle Propulsion Unit and Propulsion Unit Parts Manufacturing
336419	Other Guided Missile and Space Vehicle Parts and Auxiliary Equipment Manufacturing
336510	Railroad Rolling Stock Manufacturing
	Ship Building and Repairing

336612	Boat Building
336991	Motorcycle, Bicycle, and Parts Manufacturing
336992	Military Armored Vehicle, Tank, and Tank Component Manufacturing
336999	All Other Transportation Equipment Manufacturing
339112	Surgical and Medical Instrument Manufacturing
339113	Surgical appliance & supplies manufacturing

Summary and Conclusions

Assets

- The Vermont Aerospace and Aviation Association has been working to develop the State's aerospace economy through efforts in network development and business attraction and retention.
- Manufacturing provides the State will steady jobs that pay good wages. Nationally,
 manufacturing is making resurgence through more highly-skilled niche manufacturing
 operations that require a technically savvy workforce. This growth is occurring in small to
 medium-sized companies that develop a niche in national and regional global supply chains.
 Those companies that are succeeding are value-add with a focus on quality. These
 characteristics are a good fit for Vermont which has had success in small-to medium-sized
 businesses with a focus on a quality brand.
- The "Semiconductor and Circuit Manufacturing" industry has a high location quotient that is related to the IBM operations in Chittenden County. This industry is strong in Vermont so opportunities do exist, especially as more consumer products require higher and higher levels of technology, such as smartphones and personal vehicles.
- Higher than average wages.
- Nationally, growth in re-shoring and on-shoring increasing activity in U.S. This is being driven by reduction in energy costs in the US, focus on quality, proximity to North American consumer wholesale and markets, a reduction in the value of the US dollar, and a focus on overall, finalcost to market.
- Detailed strategies development by Vermont Advanced Manufacturing Partnership to support and grow manufacturing provide roadmap for the State.

Challenges

- Increased competition from global producers will make it difficult for Semiconductor and Circuit
 Manufacturing in the United States. The price of these products is expected to weaken, likely
 causing a reduction in the number of industry operators. A concentration of a few large
 businesses in this sector in Vermont puts the state at risk.
- Manufacturing companies that rely on research and development, such as Medical Device
 Manufacturing, prefer to locate near major metropolitan areas (access to workforce,
 infrastructure, investors and other support services) which may make it difficult for Vermont to
 compete. A reliance on access and proximity to major research and development centers as well
 as hospitals and institutions puts the State at a significant disadvantage.
- Manufacturing companies are increasingly relying on R&D. The lack of funding for innovation and commercialization in Vermont may make it difficult to attraction manufacturing firms.

• Historic job losses have led to perception that industry offers few future employment opportunities, yet lack of skilled workers persist.

Data Findings

In 2013, employment in the Manufacturing and Aerospace Cluster in Vermont totaled 15,267, representing 4.28% of all employment in Vermont in that year.

In 2012, there were 270 total establishments in the Manufacturing and Aerospace Cluster in Vermont, accounting for 1.10% of all establishments in Vermont. The average establishment size in the Manufacturing and Aerospace Cluster was 57 employees per establishment and is much higher than the average establishment size of 14.5 in Vermont for all industries.

The location quotient analysis identified a number of industries that are significantly more concentrated in Vermont compared to the national average, including: Semiconductor and Related Device Manufacturing (10.20), Other Measuring and Controlling Device Manufacturing (11.79), Aircraft Engine and Engine Parts Manufacturing (5.81), Irradiation Apparatus Manufacturing (16.23), Plastics and Rubber Industry Machinery Manufacturing (8.84), Electric Capacitor Manufacturing (17.39), Scale and Balance Manufacturing (11.20), and many others.

Between 2008 and 2013 the Manufacturing and Aerospace Cluster lost 10% of employment (1,724 jobs). Losses were driven by Semiconductor and Related Device Manufacturing (646 jobs lost) and Motor Vehicle Steering and Suspension Components Manufacturing (293 jobs lost). All Other Miscellaneous Electrical Equipment and Component Manufacturing (272 jobs gained) and Commercial, Industrial, and Institutional Electric Lighting Fixture Manufacturing (209 jobs gained) led the Manufacturing and Aerospace subsectors with job increases. Overall, the Manufacturing and Aerospace Cluster is projected to continue to lose employment between 2013 and 2023, but the decline should slow (2% decrease between 2013 and 2023). Employment increases are projected to be led by Irradiation Apparatus Manufacturing (325 jobs to be gained), and Commercial, Industrial, and Institutional Electric Lighting Fixture Manufacturing (229 jobs to be gained).

In 2013, top occupations in the Manufacturing and Aerospace Cluster include Electrical and Electronic Equipment Assemblers (1,088 jobs), and Team Assemblers (886 jobs).

Between 2013 and 2023, occupation growth in the Manufacturing and Aerospace Cluster is projected to be driven by Team Assemblers (45 jobs to be gained), Welders, Cutters, Solderers, and Brazers (22 jobs to be gained), Computer-Controlled Machine Tool Operators, Metal and Plastic Workers (20 jobs to be gained), and Software Developers, Systems Software (17 jobs to be gained).

Wages in the Manufacturing and Aerospace Cluster are typically higher than average wages in all industries in Vermont, which in 2013 were \$38,401 annually. Most occupations in the Manufacturing and Aerospace Cluster require at least an Associate's Degree and many require Bachelor Degree and higher.

Existing Conditions

	Manufacturing and Aerospace Cluster - Current Employment and Establishments								
NAICS	Description	2013 Jobs	% of Cluster	% of VT Jobs	# of Est.	Emp. per Est.	LQ		
334413	Semiconductor and Related Device Manufacturing	4,555	29.84%	1.28%	4	1,139	10.20		
336412	Aircraft Engine and Engine Parts Manufacturing	1,071	7.02%	0.30%	4	268	5.81		
334519	Other Measuring and Controlling Device Manufacturing	866	5.67%	0.24%	4	217	11.79		

332710	Machine Shops	656	4.30%	0.18%	31	21	0.94
334517	Irradiation Apparatus	491	3.22%	0.14%	3	164	16.23
333515	Manufacturing Cutting Tool and Machine Tool	424	2.78%	0.12%	10	42	6.94
335999	Accessory Manufacturing All Other Miscellaneous Electrical Equipment and Component	315	2.06%	0.09%	5	63	4.76
	Manufacturing						
333220	Plastics and Rubber Industry Machinery Manufacturing	295	1.93%	0.08%	3	98	8.84
333512	Machine Tool (Metal Cutting Types) Manufacturing	282	1.85%	0.08%	4	71	4.50
333414	Heating Equipment (except Warm Air Furnaces) Manufacturing	281	1.84%	0.08%	6	47	7.15
336330	Motor Vehicle Steering and Suspension Components (except Spring) Manufacturing	256	1.68%	0.07%	2	128	3.47
336413	Other Aircraft Parts and Auxiliary Equipment Manufacturing	255	1.67%	0.07%	5	51	1.04
333298	All Other Industrial Machinery Manufacturing	241	1.58%	0.07%	5	48	3.21
334414	Electronic Capacitor Manufacturing	237	1.55%	0.07%	2	119	17.39
332322	Sheet Metal Work Manufacturing	234	1.53%	0.07%	11	21	0.99
333314	Optical Instrument and Lens Manufacturing	233	1.53%	0.07%	6	39	4.90
335122	Commercial, Industrial, and Institutional Electric Lighting Fixture Manufacturing	214	1.40%	0.06%	3	71	4.67
339112	Surgical and Medical Instrument Manufacturing	189	1.24%	0.05%	4	47	0.66
332212	Hand and Edge Tool Manufacturing	181	1.19%	0.05%	4	45	3.01
332911	Industrial Valve Manufacturing	179	1.17%	0.05%	1	179	2.82
335129	Other Lighting Equipment Manufacturing	160	1.05%	0.04%	3	53	7.67
335912	Primary Battery Manufacturing	151	0.99%	0.04%	1	151	5.33
335929	Other Communication and Energy Wire Manufacturing	150	0.98%	0.04%	3	50	5.03
339113	Surgical Appliance and Supplies Manufacturing	142	0.93%	0.04%	7	20	0.60
336992	Military Armored Vehicle, Tank, and Tank Component Manufacturing	136	0.89%	0.04%	2	68	6.62
333319	Other Commercial and Service Industry Machinery Manufacturing	131	0.86%	0.04%	1	131	1.20
333999	All Other Miscellaneous General Purpose Machinery Manufacturing	118	0.77%	0.03%	5	24	1.25
332999	All Other Miscellaneous Fabricated Metal Product Manufacturing	117	0.77%	0.03%	6	20	0.81
334516	Analytical Laboratory Instrument Manufacturing	114	0.75%	0.03%	2	57	1.47
333997	Scale and Balance Manufacturing	111	0.73%	0.03%	3	37	11.20

333514	Special Die and Tool, Die Set, Jig, and Fixture Manufacturing	105	0.69%	0.03%	4	26	0.67
333294	Food Product Machinery Manufacturing	102	0.67%	0.03%	2	51	2.49
334412	Bare Printed Circuit Board Manufacturing	101	0.66%	0.03%	3	34	1.19
332116	Metal Stamping	99	0.65%	0.03%	4	25	0.82
335991	Carbon and Graphite Product Manufacturing	99	0.65%	0.03%	2	50	5.67
336350	Motor Vehicle Transmission and Power Train Parts Manufacturing	98	0.64%	0.03%	1	98	0.62
334419	Other Electronic Component Manufacturing	93	0.61%	0.03%	5	19	0.63
332812	Metal Coating, Engraving (except Jewelry and Silverware), and Allied Services to Manufacturers	86	0.56%	0.02%	4	22	0.66
334310	Audio and Video Equipment Manufacturing	82	0.54%	0.02%	2	41	1.71
334511	Search, Detection, Navigation, Guidance, Aeronautical, and Nautical System and Instrument Manufacturing	80	0.52%	0.02%	4	20	0.26
332312	Fabricated Structural Metal Manufacturing	78	0.51%	0.02%	5	16	0.38
332813	Electroplating, Plating, Polishing, Anodizing, and Coloring	78	0.51%	0.02%	2	39	0.52
332211	Cutlery and Flatware (except Precious) Manufacturing	73	0.48%	0.02%	1	73	4.72
335121	Residential Electric Lighting Fixture Manufacturing	70	0.46%	0.02%	1	70	3.57
334510	Electromedical and Electrotherapeutic Apparatus Manufacturing	68	0.45%	0.02%	6	11	0.50
334513	Instruments and Related Products Manufacturing for Measuring, Displaying, and Controlling Industrial Process Variables	67	0.44%	0.02%	7	10	0.47
335110	Electric Lamp Bulb and Part Manufacturing	67	0.44%	0.02%	2	34	3.17
332722	Bolt, Nut, Screw, Rivet, and Washer Manufacturing	61	0.40%	0.02%	2	31	0.66
333611	Turbine and Turbine Generator Set Units Manufacturing	60	0.39%	0.02%	1	60	0.89
333996	Fluid Power Pump and Motor Manufacturing	56	0.37%	0.02%	1	56	1.25
333913	Measuring and Dispensing Pump Manufacturing	53	0.35%	0.01%	1	53	7.46
335921	Fiber Optic Cable Manufacturing	51	0.33%	0.01%	2	26	2.68
334119	Other Computer Peripheral Equipment Manufacturing	50	0.33%	0.01%	3	17	0.61
335314	Relay and Industrial Control Manufacturing	50	0.33%	0.01%	2	25	0.46
333511	Industrial Mold Manufacturing	45	0.29%	0.01%	2	23	0.52
333991	Power-Driven Handtool Manufacturing	44	0.29%	0.01%	1	44	2.38

333295	Semiconductor Machinery Manufacturing	42	0.28%	0.01%	3	14	1.12
336399	All Other Motor Vehicle Parts Manufacturing	40	0.26%	0.01%	0	40	0.13
332313	Plate Work Manufacturing	36	0.24%	0.01%	3	12	0.30
336312	Gasoline Engine and Engine Parts Manufacturing	36	0.24%	0.01%	2	18	0.32
332213	Saw Blade and Handsaw Manufacturing	29	0.19%	0.01%	1	29	2.56
333120	Construction Machinery Manufacturing	29	0.19%	0.01%	2	15	0.17
333411	Air Purification Equipment Manufacturing	26	0.17%	0.01%	2	13	0.64
336211	Motor Vehicle Body Manufacturing	26	0.17%	0.01%	1	26	0.20
335931	Current-Carrying Wiring Device Manufacturing	25	0.16%	0.01%	0	25	0.34
332311	Prefabricated Metal Building and Component Manufacturing	23	0.15%	0.01%	1	23	0.35
332323	Ornamental and Architectural Metal Work Manufacturing	23	0.15%	0.01%	8	3	0.27
332431	Metal Can Manufacturing	23	0.15%	0.01%	2	12	0.48
334418	Printed Circuit Assembly (Electronic Assembly) Manufacturing	21	0.14%	0.01%	2	11	0.17
334612	Prerecorded Compact Disc (except Software), Tape, and Record Reproducing	21	0.14%	0.01%	0	21	1.03
334515	Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals	20	0.13%	0.01%	1	20	0.21
334514	Totalizing Fluid Meter and Counting Device Manufacturing	11	0.07%	0.00%	1	11	0.46
336120	Heavy Duty Truck Manufacturing	11	0.07%	0.00%	1	11	0.18
332721	Precision Turned Product Manufacturing	10	0.07%	0.00%	3	3	0.11
	turing and Aerospace Total	15,267	100.00%	4.28%	270	57	
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Source: QCEW Employees, Non-QCEW Employees & Self-Employed - EMSI 2013.4 Class of Worker Note: Industries with fewer than 10 employees not included

Industry Data

Historic 2008-2013

	Manufacturing and Aerospace Cluster - Historic Growth							
NAICS	Description	2008 Jobs	2013 Jobs	# Change	% Change			
335999	All Other Miscellaneous Electrical Equipment and Component Manufacturing	43	315	272	633%			
335122	Commercial, Industrial, and Institutional Electric Lighting Fixture Manufacturing	<10	214	209	4180%			
336992	Military Armored Vehicle, Tank, and Tank Component Manufacturing	0	136	136	13600%			
335991	Carbon and Graphite Product Manufacturing	16	99	83	519%			
333294	Food Product Machinery Manufacturing	21	102	81	386%			

334511	Search, Detection, Navigation, Guidance, Aeronautical, and Nautical System and Instrument Manufacturing	<10	80	75	1500%
333414	Heating Equipment (except Warm Air Furnaces) Manufacturing	206	281	75	36%
332999	All Other Miscellaneous Fabricated Metal Product Manufacturing	46	117	71	154%
332211	Cutlery and Flatware (except Precious) Manufacturing	<10	73	68	1360%
332813	Electroplating, Plating, Polishing, Anodizing, and Coloring	24	78	54	225%
334516	Analytical Laboratory Instrument Manufacturing	64	114	50	78%
334519	Other Measuring and Controlling Device Manufacturing	816	866	50	6%
333611	Turbine and Turbine Generator Set Units Manufacturing	16	60	44	275%
333298	All Other Industrial Machinery Manufacturing	202	241	39	19%
334310	Audio and Video Equipment Manufacturing	43	82	39	91%
334517	Irradiation Apparatus Manufacturing	453	491	38	8%
332722	Bolt, Nut, Screw, Rivet, and Washer Manufacturing	26	61	35	135%
339113	Surgical Appliance and Supplies Manufacturing	117	142	25	21%
333996	Fluid Power Pump and Motor Manufacturing	33	56	23	70%
336413	Other Aircraft Parts and Auxiliary Equipment Manufacturing	235	255	20	9%
332311	Prefabricated Metal Building and Component Manufacturing	<10	23	18	360%
332431	Metal Can Manufacturing	<10	23	18	360%
332213	Saw Blade and Handsaw Manufacturing	13	29	16	123%
332322	Sheet Metal Work Manufacturing	218	234	16	7%
334513	Instruments and Related Products Manufacturing for Measuring, Displaying, and Controlling Industrial Process Variables	51	67	16	31%
332313	Plate Work Manufacturing	22	36	14	64%
336312	Gasoline Engine and Engine Parts Manufacturing	22	36	14	64%
336120	Heavy Duty Truck Manufacturing	0	11	11	1100%
333511	Industrial Mold Manufacturing	35	45	10	29%
333220	Plastics and Rubber Industry Machinery Manufacturing	286	295	9	3%
333314	Optical Instrument and Lens Manufacturing	224	233	9	4%
335931	Current-Carrying Wiring Device Manufacturing	17	25	8	47%
333913	Measuring and Dispensing Pump Manufacturing	50	53	3	6%
332721	Precision Turned Product Manufacturing	14	10	(4)	-29%
334414	Electronic Capacitor Manufacturing	241	237	(4)	-2%
336211	Motor Vehicle Body Manufacturing	31	26	(5)	-16%
334290	Other Communications Equipment Manufacturing	11	<10	(6)	-55%

336999	All Other Transportation Equipment Manufacturing	12	<10	(7)	-58%
334419	Other Electronic Component Manufacturing	101	93	(8)	-8%
335314	Relay and Industrial Control Manufacturing	58	50	(8)	-14%
334412	Bare Printed Circuit Board Manufacturing	110	101	(9)	-8%
336612	Boat Building	16	<10	(11)	-69%
333411	Air Purification Equipment Manufacturing	37	26	(11)	-30%
333514	Special Die and Tool, Die Set, Jig, and Fixture Manufacturing	118	105	(13)	-11%
332812	Metal Coating, Engraving (except Jewelry and Silverware), and Allied Services to Manufacturers	101	86	(15)	-15%
333991	Power-Driven Handtool Manufacturing	59	44	(15)	-25%
333120	Construction Machinery Manufacturing	46	29	(17)	-37%
332116	Metal Stamping	119	99	(20)	-17%
335921	Fiber Optic Cable Manufacturing	71	51	(20)	-28%
332811	Metal Heat Treating	21	0	(21)	-100%
335929	Other Communication and Energy Wire Manufacturing	173	150	(23)	-13%
336399	All Other Motor Vehicle Parts Manufacturing	63	40	(23)	-37%
333999	All Other Miscellaneous General Purpose Machinery Manufacturing	143	118	(25)	-17%
333512	Machine Tool (Metal Cutting Types) Manufacturing	311	282	(29)	-9%
333319	Other Commercial and Service Industry Machinery Manufacturing	165	131	(34)	-21%
334514	Totalizing Fluid Meter and Counting Device Manufacturing	46	11	(35)	-76%
335912	Primary Battery Manufacturing	189	151	(38)	-20%
332439	Other Metal Container Manufacturing	44	<10	(39)	-89%
332312	Fabricated Structural Metal Manufacturing	121	78	(43)	-36%
332911	Industrial Valve Manufacturing	231	179	(52)	-23%
333997	Scale and Balance Manufacturing	163	111	(52)	-32%
334119	Other Computer Peripheral Equipment Manufacturing	103	50	(53)	-51%
333291	Paper Industry Machinery Manufacturing	54	0	(54)	-100%
332323	Ornamental and Architectural Metal Work Manufacturing	80	23	(57)	-71%
335311	Power, Distribution, and Specialty Transformer Manufacturing	57	0	(57)	-100%
334510	Electromedical and Electrotherapeutic Apparatus Manufacturing	142	68	(74)	-52%
332212	Hand and Edge Tool Manufacturing	258	181	(77)	-30%
335129	Other Lighting Equipment Manufacturing	238	160	(78)	-33%
332710	Machine Shops	738	656	(82)	-11%
336350	Motor Vehicle Transmission and Power Train Parts Manufacturing	184	98	(86)	-47%
334418	Printed Circuit Assembly (Electronic Assembly) Manufacturing	120	21	(99)	-83%
334612	Prerecorded Compact Disc (except Software), Tape, and Record Reproducing	120	21	(99)	-83%

335222	Household Refrigerator and Home Freezer Manufacturing	105	0	(105)	-100%
335110	Electric Lamp Bulb and Part Manufacturing	181	67	(114)	-63%
334515	Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals	144	20	(124)	-86%
333295	Semiconductor Machinery Manufacturing	170	42	(128)	-75%
339112	Surgical and Medical Instrument Manufacturing	326	189	(137)	-42%
336412	Aircraft Engine and Engine Parts Manufacturing	1,217	1,071	(146)	-12%
335121	Residential Electric Lighting Fixture Manufacturing	222	70	(152)	-68%
333515	Cutting Tool and Machine Tool Accessory Manufacturing	582	424	(158)	-27%
336330	Motor Vehicle Steering and Suspension Components (except Spring) Manufacturing	549	256	(293)	-53%
334413	Semiconductor and Related Device Manufacturing	5,201	4,555	(646)	-12%
Manufac	turing and Aerospace Total	16,991	15,267	(1,724)	-10%

Source: QCEW Employees, Non-QCEW Employees & Self-Employed - EMSI 2013.4 Class of Worker Note: Industries with fewer than 10 employees in 2008 and 2013 not included. For industries with fewer than 10 employees in only one year, analyst assumes 5 employees for purposes of calculation.

Projected 2013-2023

	Manufacturing and Agranges Clus	tor Projecto	d Crouth		
	Manufacturing and Aerospace Clus				
NAICS	Description	2013 Jobs	2023 Jobs	# Change	% Change
334517	Irradiation Apparatus Manufacturing	491	816	325	66%
335122	Commercial, Industrial, and Institutional Electric Lighting Fixture Manufacturing	214	443	229	107%
335999	All Other Miscellaneous Electrical Equipment and Component Manufacturing	315	445	130	41%
334519	Other Measuring and Controlling Device Manufacturing	866	983	117	14%
339113	Surgical Appliance and Supplies Manufacturing	142	257	115	81%
332211	Cutlery and Flatware (except Precious) Manufacturing	73	185	112	153%
333298	All Other Industrial Machinery Manufacturing	241	347	106	44%
333220	Plastics and Rubber Industry Machinery Manufacturing	295	398	103	35%
336992	Military Armored Vehicle, Tank, and Tank Component Manufacturing	136	237	101	74%
333414	Heating Equipment (except Warm Air Furnaces) Manufacturing	281	379	98	35%
332322	Sheet Metal Work Manufacturing	234	327	93	40%
334511	Search, Detection, Navigation, Guidance, Aeronautical, and Nautical System and Instrument Manufacturing	80	157	77	96%
336399	All Other Motor Vehicle Parts Manufacturing	40	115	75	188%
336413	Other Aircraft Parts and Auxiliary Equipment Manufacturing	255	327	72	28%

336312	Gasoline Engine and Engine Parts Manufacturing	36	88	52	144%
332313	Plate Work Manufacturing	36	85	49	136%
334516	Analytical Laboratory Instrument Manufacturing	114	163	49	43%
332710	Machine Shops	656	692	36	5%
336350	Motor Vehicle Transmission and Power Train Parts Manufacturing	98	128	30	31%
332213	Saw Blade and Handsaw Manufacturing	29	58	29	100%
333294	Food Product Machinery Manufacturing	102	130	28	27%
332116	Metal Stamping	99	126	27	27%
334513	Instruments and Related Products Manufacturing for Measuring, Displaying, and Controlling Industrial Process Variables	67	94	27	40%
332813	Electroplating, Plating, Polishing, Anodizing, and Coloring	78	104	26	33%
332999	All Other Miscellaneous Fabricated Metal Product Manufacturing	117	143	26	22%
335129	Other Lighting Equipment Manufacturing	160	186	26	16%
335991	Carbon and Graphite Product Manufacturing	99	125	26	26%
333319	Other Commercial and Service Industry Machinery Manufacturing	131	155	24	18%
332812	Metal Coating, Engraving (except Jewelry and Silverware), and Allied Services to Manufacturers	86	108	22	26%
332911	Industrial Valve Manufacturing	179	200	21	12%
333411	Air Purification Equipment Manufacturing	26	46	20	77%
332311	Prefabricated Metal Building and Component Manufacturing	23	42	19	83%
333913	Measuring and Dispensing Pump Manufacturing	53	71	18	34%
335931	Current-Carrying Wiring Device Manufacturing	25	36	11	44%
333131	Mining Machinery and Equipment Manufacturing	<10	15	10	200%
333120	Construction Machinery Manufacturing	29	38	9	31%
332618	Other Fabricated Wire Product Manufacturing	<10	12	7	140%
333996	Fluid Power Pump and Motor Manufacturing	56	62	6	11%
333511	Industrial Mold Manufacturing	45	50	5	11%
332722	Bolt, Nut, Screw, Rivet, and Washer Manufacturing	61	62	1	2%
333314	Optical Instrument and Lens Manufacturing	233	233	0	0%
333611	Turbine and Turbine Generator Set Units Manufacturing	60	60	0	0%
332431	Metal Can Manufacturing	23	22	(1)	-4%
334414	Electronic Capacitor Manufacturing	237	233	(4)	-2%
332721	Precision Turned Product Manufacturing	10	<10	(5)	-50%
334514	Totalizing Fluid Meter and Counting Device Manufacturing	11	<10	(6)	-55%
336120	Heavy Duty Truck Manufacturing	11	<10	(6)	-55%
334612	Prerecorded Compact Disc (except Software), Tape, and Record Reproducing	21	15	(6)	-29%
335314	Relay and Industrial Control Manufacturing	50	43	(7)	-14%
334310	Audio and Video Equipment Manufacturing	82	73	(9)	-11%

335921	Fiber Optic Cable Manufacturing	51	42	(9)	-18%
333991	Power-Driven Handtool Manufacturing	44	34	(10)	-23%
332312	Fabricated Structural Metal Manufacturing	78	67	(11)	-14%
333999	All Other Miscellaneous General Purpose Machinery Manufacturing	118	106	(12)	-10%
336211	Motor Vehicle Body Manufacturing	26	12	(14)	-54%
334515	Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals	20	<10	(15)	-75%
334418	Printed Circuit Assembly (Electronic Assembly) Manufacturing	21	<10	(16)	-76%
333997	Scale and Balance Manufacturing	111	94	(17)	-15%
332323	Ornamental and Architectural Metal Work Manufacturing	23	<10	(18)	-78%
334119	Other Computer Peripheral Equipment Manufacturing	50	31	(19)	-38%
339112	Surgical and Medical Instrument Manufacturing	189	166	(23)	-12%
334419	Other Electronic Component Manufacturing	93	61	(32)	-34%
333295	Semiconductor Machinery Manufacturing	42	<10	(37)	-88%
333514	Special Die and Tool, Die Set, Jig, and Fixture Manufacturing	105	58	(47)	-45%
335110	Electric Lamp Bulb and Part Manufacturing	67	<10	(62)	-93%
334510	Electromedical and Electrotherapeutic Apparatus Manufacturing	68	<10	(63)	-93%
335121	Residential Electric Lighting Fixture Manufacturing	70	<10	(65)	-93%
334412	Bare Printed Circuit Board Manufacturing	101	36	(65)	-64%
335929	Other Communication and Energy Wire Manufacturing	150	84	(66)	-44%
332212	Hand and Edge Tool Manufacturing	181	103	(78)	-43%
335912	Primary Battery Manufacturing	151	30	(121)	-80%
333512	Machine Tool (Metal Cutting Types) Manufacturing	282	150	(132)	-47%
336412	Aircraft Engine and Engine Parts Manufacturing	1,071	936	(135)	-13%
333515	Cutting Tool and Machine Tool Accessory Manufacturing	424	262	(162)	-38%
336330	Motor Vehicle Steering and Suspension Components (except Spring) Manufacturing	256	49	(207)	-81%
334413	Semiconductor and Related Device Manufacturing	4,555	3,391	(1,164)	-26%
Manufac	turing and Aerospace Total	15,267	14,933	(334)	-2%

Source: QCEW Employees, Non-QCEW Employees & Self-Employed - EMSI 2013.4 Class of Worker Note: Industries with fewer than 10 employees in 2008 and 2013 not included. For industries with fewer than 10 employees in only one year, analyst assumes 5 employees for purposes of calculation.

Occupation Data

	Manufacturing and Aerospace Cluster - Occupation Analysis (20 largest)									
SOC	Occupation	2013 Jobs	Annual Wages	Education Required						

51-2022	Electrical and Electronic Equipment Assemblers	1,088	\$27,400	Short-term on-the-job training
51-2092	Team Assemblers	886	\$27,800	Moderate-term on-the-job training
17-3023	Electrical and Electronics Engineering Technicians	565	\$64,220	Associate's degree
51-1011	First-Line Supervisors of Production and Operating Workers	524	\$51,580	Work experience in a related occupation
51-4011	Computer-Controlled Machine Tool Operators, Metal and Plastic	516	\$33,060	Moderate-term on-the-job training
51-4041	Machinists	509	\$35,160	Long-term on-the-job training
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	480	\$30,780	Moderate-term on-the-job training
11-9041	Architectural and Engineering Managers	368	\$104,020	Bachelor's or higher degree, plus work experience
17-2071	Electrical Engineers	288	\$74,820	Bachelor's degree
17-2112	Industrial Engineers	285	\$66,940	Bachelor's degree
43-5071	Shipping, Receiving, and Traffic Clerks	245	\$28,420	Short-term on-the-job training
43-3031	Bookkeeping, Accounting, and Auditing Clerks	241	\$33,200	Moderate-term on-the-job training
11-1021	General and Operations Managers	240	\$79,200	Bachelor's or higher degree, plus work experience
17-2141	Mechanical Engineers	235	\$68,560	Bachelor's degree
15-1133	Software Developers, Systems Software	231	\$88,980	Bachelor's degree
17-2061	Computer Hardware Engineers	226	\$87,460	Bachelor's degree
51-4121	Welders, Cutters, Solderers, and Brazers	224	\$34,080	Postsecondary non-degree award
51-4081	Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic	216	\$32,580	Moderate-term on-the-job training
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	213	\$49,740	Moderate-term on-the-job training
13-1023	Purchasing Agents, Except Wholesale, Retail, and Farm Products	210	\$49,740	Long-term on-the-job training

Note: Annual wages based on 2,000 hours per

year

Historic 2008-2013

Ma	Manufacturing and Aerospace Cluster - Historic Occupation Growth (Top 20 Largest Growth)								
SOC	Occupation	2008 Jobs	2013 Jobs	# Change	% Change				
Total	All Cluster Occupations	16,551	14,874	(1,677)	(10%)				
51-4021	Extruding and Drawing Machine Setters, Operators, and Tenders, Metal and Plastic	61	75	14	23%				

13-1161 Market Research Analysts and Marketing Specialists 126 126 0 0% 51-4199 Metal Workers and Plastic Workers, All Other 30 30 0 0% 51-4191 Operators, and Tenders, Metal and Plastic 28 28 0 0% 51-4191 Operators, and Tenders, Metal and Plastic 28 28 0 0% 51-9021 Marchine, Grinding, and Polishing Machine Setters, Operators, and Tenders 17 17 0 0% 47-2031 Carpenters 12 12 12 0 0% 47-2031 Carpenters 12 12 12 0 0% 47-2031 Payroll and Timekeeping Clerks 28 27 (1) (4%) 33-9032 Security Guards 19 18 (1) (5%) 17-2041 Chemical Engineers 17 16 (1) (6%) 17-2041 Chemical Engineers 17 16 (1) (6%) 18-2031 Budget Analysts 15 14 (1) (7%) <td< th=""><th></th><th></th><th></th><th></th><th></th><th></th></td<>						
Other Heat Treating Equipment Setters, Operators, and Tenders, Metal and Plastic Operators, and Tenders, Metal and Plastic Operators, and Tenders, Metal and Plastic Operators, and Tenders 17 17 0 0% Machine Setters, Operators, and Tenders 17 17 0 0% 0% 0% 0% 0% 0% 0%	13-1161	·	126	126	0	0%
51-4191 Operators, and Tenders, Metal and Plastic 28 28 0 0% 51-9021 Crushing, Grinding, and Polishing Machine Setters, Operators, and Tenders 17 17 0 0% 47-2031 Carpenters 12 12 0 0% 11-9199 Managers, All Other 50 49 (1) (2%) 43-3051 Payroll and Timekeeping Clerks 28 27 (1) (4%) 33-9032 Security Guards 19 18 (1) (5%) 17-2041 Chemical Engineers 17 16 (1) (6%) Extruding, Forming, Pressing, and 15 14 (1) (6%) 17-9041 Compacting Machine Setters, Operators, and Tenders 17 16 (1) (6%) 13-2031 Budget Analysts 15 14 (1) (7%) 23-1011 Lawyers 15 14 (1) (7%) 43-4161 Human Resources Assistants, Except Payroll and Timekeeping 14 13 (1)	51-4199	· ·	30	30	0	0%
51-9021 Machine Setters, Operators, and Tenders 17 17 0 0% 47-2031 Carpenters 12 12 0 0% 11-9199 Managers, All Other 50 49 (1) (2%) 43-3051 Payroll and Timekeeping Clerks 28 27 (1) (4%) 33-9032 Security Guards 19 18 (1) (5%) 17-2041 Chemical Engineers 17 16 (1) (6%) Extruding, Forming, Pressing, and Compacting Machine Setters, Operators, and Tenders 17 16 (1) (6%) 51-9041 Compacting Machine Setters, Operators, and Tenders 15 14 (1) (7%) 13-2031 Budget Analysts 15 14 (1) (7%) 23-1011 Lawyers 15 14 (1) (7%) 15-2031 Operations Research Analysts 14 13 (1) (7%) 43-4161 Human Resources Assistants, Except Payroll and Timekeeping 14 13 (1) (7%) 53-1021 Health and Safety Engineers	51-4191	Operators, and Tenders, Metal and	28	28	0	0%
11-9199 Managers, All Other 50 49 (1) (2%) 43-3051 Payroll and Timekeeping Clerks 28 27 (1) (4%) 33-9032 Security Guards 19 18 (1) (5%) 17-2041 Chemical Engineers 17 16 (1) (6%) Extruding, Forming, Pressing, and 15 16 (1) (6%) 51-9041 Compacting Machine Setters, Operators, and Tenders 17 16 (1) (6%) 13-2031 Budget Analysts 15 14 (1) (7%) 23-1011 Lawyers 15 14 (1) (7%) 15-2031 Operations Research Analysts 14 13 (1) (7%) 43-4161 Human Resources Assistants, Except Payroll and Timekeeping 14 13 (1) (7%) 47-2111 Health and Safety Engineers, Except Mining Safety Engineers and Inspectors 13 12 (1) (8%) 51-4023 First-Line Supervisors of Helpers, Laborers, and Material Movers, Hand 13 12 (1) (8%) 51-9032 Cu	51-9021	O. O.	17	17	0	0%
43-3051 Payroll and Timekeeping Clerks 28 27 (1) (4%) 33-9032 Security Guards 19 18 (1) (5%) 17-2041 Chemical Engineers 17 16 (1) (6%) Extruding, Forming, Pressing, and 51-9041 Compacting Machine Setters, Operators, and Tenders 17 16 (1) (6%) 13-2031 Budget Analysts 15 14 (1) (7%) 23-1011 Lawyers 15 14 (1) (7%) 15-2031 Operations Research Analysts 14 13 (1) (7%) 43-4161 Human Resources Assistants, Except Payroll and Timekeeping 14 13 (1) (7%) 47-2111 Health and Safety Engineers, Except Mining Safety Engineers and Inspectors 13 12 (1) (8%) 53-1021 First-Line Supervisors of Helpers, Laborers, and Material Movers, Hand 13 12 (1) (8%) 51-4023 Rolling Machine Setters, Operators, and Tenders, Metal and Plastic 12 11 (1) (8%) 51-9032 Cutting and Slicin	47-2031	Carpenters	12	12	0	0%
33-9032 Security Guards 19 18 (1) (5%) 17-2041 Chemical Engineers 17 16 (1) (6%) Extruding, Forming, Pressing, and 51-9041 Compacting Machine Setters, Operators, and Tenders 17 16 (1) (6%) 13-2031 Budget Analysts 15 14 (1) (7%) 23-1011 Lawyers 15 14 (1) (7%) 15-2031 Operations Research Analysts 14 13 (1) (7%) 43-4161 Human Resources Assistants, Except Payroll and Timekeeping 14 13 (1) (7%) 17-2111 Health and Safety Engineers, Except Mining Safety Engineers and Inspectors 13 12 (1) (8%) 53-1021 First-Line Supervisors of Helpers, Laborers, and Material Movers, Hand 13 12 (1) (8%) 51-4023 Rolling Machine Setters, Operators, and Tenders, Metal and Plastic 12 11 (1) (8%) 51-9032 Cutting and Slicing Machine Setters, Operators, and Tenders 12 11 (1) (8%) 13-1051	11-9199	Managers, All Other	50	49	(1)	(2%)
17-2041 Chemical Engineers 17 16 (1) (6%) Extruding, Forming, Pressing, and 10 (1) (6%) 51-9041 Compacting Machine Setters, Operators, and Tenders 17 16 (1) (6%) 13-2031 Budget Analysts 15 14 (1) (7%) 23-1011 Lawyers 15 14 (1) (7%) 15-2031 Operations Research Analysts 14 13 (1) (7%) 43-4161 Human Resources Assistants, Except Payroll and Timekeeping 14 13 (1) (7%) 17-2111 Health and Safety Engineers, Except Mining Safety Engineers and Inspectors 13 12 (1) (8%) 53-1021 First-Line Supervisors of Helpers, Laborers, and Material Movers, Hand 13 12 (1) (8%) 51-4023 Rolling Machine Setters, Operators, and Tenders, Metal and Plastic 12 11 (1) (8%) 51-9032 Cutting and Slicing Machine Setters, Operators, and Tenders 12 11 (1) (8%) 13-1051 Cost Estimators 54 52 (2) (4%) </td <td>43-3051</td> <td>Payroll and Timekeeping Clerks</td> <td>28</td> <td>27</td> <td>(1)</td> <td>(4%)</td>	43-3051	Payroll and Timekeeping Clerks	28	27	(1)	(4%)
Extruding, Forming, Pressing, and Compacting Machine Setters, Operators, and Tenders 13-2031 Budget Analysts 15 14 (1) (7%) 23-1011 Lawyers 15 14 (1) (7%) 15-2031 Operations Research Analysts 14 13 (1) (7%) 43-4161 Human Resources Assistants, Except Payroll and Timekeeping 17-2111 Health and Safety Engineers, Except Mining Safety Engineers and Inspectors 18-1021 First-Line Supervisors of Helpers, Laborers, and Material Movers, Hand 19-14023 Rolling Machine Setters, Operators, and Tenders, Metal and Plastic Cutting and Slicing Machine Setters, Operators, and Tenders, and Tenders 13-1051 Cost Estimators 14 15 (1) (8%) 17-2111 (1) (8%) 18-2111 (1) (8%) 19-2121 (1) (8%) 19-2121 (1) (8%) 19-2121 (1) (8%) 19-2121 (1) (8%) 19-2121 (1) (8%) 19-2121 (1) (8%) 19-2121 (1) (8%) 19-2121 (1) (8%) 19-2121 (1) (8%) 19-2121 (1) (8%) 19-2121 (1) (8%) 19-2121 (1) (8%) 19-2121 (1) (8%) 19-2121 (1) (8%)	33-9032	Security Guards	19	18	(1)	(5%)
51-9041 Compacting Machine Setters, Operators, and Tenders 17 16 (1) (6%) 13-2031 Budget Analysts 15 14 (1) (7%) 23-1011 Lawyers 15 14 (1) (7%) 15-2031 Operations Research Analysts 14 13 (1) (7%) 43-4161 Human Resources Assistants, Except Payroll and Timekeeping 14 13 (1) (7%) 17-2111 Health and Safety Engineers, Except Mining Safety Engineers and Inspectors 13 12 (1) (8%) 53-1021 First-Line Supervisors of Helpers, Laborers, and Material Movers, Hand 13 12 (1) (8%) 51-4023 Rolling Machine Setters, Operators, and Tenders, Metal and Plastic 12 11 (1) (8%) 51-9032 Cutting and Slicing Machine Setters, Operators, and Tenders 12 11 (1) (8%) 13-1051 Cost Estimators 54 52 (2) (4%) 13-1041 Compliance Officers 49 47 (2) (4%)	17-2041	Chemical Engineers	17	16	(1)	(6%)
23-1011 Lawyers 15 14 (1) (7%) 15-2031 Operations Research Analysts 14 13 (1) (7%) 43-4161 Human Resources Assistants, Except Payroll and Timekeeping 14 13 (1) (7%) 17-2111 Health and Safety Engineers, Except Mining Safety Engineers and Inspectors 13 12 (1) (8%) 53-1021 First-Line Supervisors of Helpers, Laborers, and Material Movers, Hand 13 12 (1) (8%) 51-4023 Rolling Machine Setters, Operators, and Tenders, Metal and Plastic 12 11 (1) (8%) 51-9032 Cutting and Slicing Machine Setters, Operators, and Tenders 12 11 (1) (8%) 13-1051 Cost Estimators 54 52 (2) (4%) 13-1041 Compliance Officers 49 47 (2) (4%)	51-9041	Compacting Machine Setters, Operators,	17	16	(1)	(6%)
15-2031 Operations Research Analysts 14 13 (1) (7%) 43-4161 Human Resources Assistants, Except Payroll and Timekeeping 14 13 (1) (7%) 17-2111 Health and Safety Engineers, Except Mining Safety Engineers and Inspectors 13 12 (1) (8%) 53-1021 First-Line Supervisors of Helpers, Laborers, and Material Movers, Hand 13 12 (1) (8%) 51-4023 Rolling Machine Setters, Operators, and Tenders, Metal and Plastic 12 11 (1) (8%) 51-9032 Cutting and Slicing Machine Setters, Operators, and Tenders 12 11 (1) (8%) 13-1051 Cost Estimators 54 52 (2) (4%) 13-1041 Compliance Officers 49 47 (2) (4%)	13-2031	Budget Analysts	15	14	(1)	(7%)
Human Resources Assistants, Except Payroll and Timekeeping 17-2111 Health and Safety Engineers, Except Mining Safety Engineers and Inspectors 53-1021 First-Line Supervisors of Helpers, Laborers, and Material Movers, Hand 51-4023 Rolling Machine Setters, Operators, and Tenders, Metal and Plastic 51-9032 Cutting and Slicing Machine Setters, Operators, and Tenders, and Tenders Metal and Plastic 51-9032 Cutting and Slicing Machine Setters, Operators, and Tenders 12 11 (1) (8%) 13-1051 Cost Estimators 54 52 (2) (4%) 13-1041 Compliance Officers	23-1011	Lawyers	15	14	(1)	(7%)
43-4161 Payroll and Timekeeping 14 13 (1) (7%) 17-2111 Health and Safety Engineers, Except Mining Safety Engineers and Inspectors 13 12 (1) (8%) 53-1021 First-Line Supervisors of Helpers, Laborers, and Material Movers, Hand 13 12 (1) (8%) 51-4023 Rolling Machine Setters, Operators, and Tenders, Metal and Plastic 12 11 (1) (8%) 51-9032 Cutting and Slicing Machine Setters, Operators, and Tenders 12 11 (1) (8%) 13-1051 Cost Estimators 54 52 (2) (4%) 13-1041 Compliance Officers 49 47 (2) (4%)	15-2031	Operations Research Analysts	14	13	(1)	(7%)
Mining Safety Engineers and Inspectors First-Line Supervisors of Helpers, Laborers, and Material Movers, Hand Rolling Machine Setters, Operators, and Tenders, Metal and Plastic Cutting and Slicing Machine Setters, Operators, and Tenders, and Tenders Coperators, and Tenders Cost Estimators Compliance Officers Mining Safety Engineers and Inspectors 13	43-4161		14	13	(1)	(7%)
53-1021 Laborers, and Material Movers, Hand 13 12 (1) (8%) 51-4023 Rolling Machine Setters, Operators, and Tenders, Metal and Plastic 12 11 (1) (8%) 51-9032 Cutting and Slicing Machine Setters, Operators, and Tenders 12 11 (1) (8%) 13-1051 Cost Estimators 54 52 (2) (4%) 13-1041 Compliance Officers 49 47 (2) (4%)	17-2111		13	12	(1)	(8%)
Tenders, Metal and Plastic Tenders, Metal and Plastic Cutting and Slicing Machine Setters, Operators, and Tenders 12	53-1021	· · · · · · · · · · · · · · · · · · ·	13	12	(1)	(8%)
Operators, and Tenders 12 11 (1) (8%) 13-1051 Cost Estimators 13-1041 Compliance Officers 154 52 (2) (4%) 13-1041 Compliance Officers 16 49 47 (2) (4%)	51-4023	•	12	11	(1)	(8%)
13-1041 Compliance Officers 49 47 (2) (4%)	51-9032		12	11	(1)	(8%)
	13-1051	Cost Estimators	54	52	(2)	(4%)
51-9022 Grinding and Polishing Workers, Hand 47 45 (2)	13-1041	Compliance Officers	49	47	(2)	(4%)
	51-9022	Grinding and Polishing Workers, Hand	47	45	(2)	(4%)

Projected 2013-2023

Manufacturing and Aerospace Cluster - Projected Occupation Growth (Top 20 Largest Growth)					
SOC	Occupation	2013 Jobs	2023 Jobs	# Change	% Change
Total	All Cluster Occupations	14,874	14,527	(347)	(2%)
51-2092	Team Assemblers	886	931	45	5%
51-4121	Welders, Cutters, Solderers, and Brazers	224	246	22	10%
51-4011	Computer-Controlled Machine Tool Operators, Metal and Plastic	516	536	20	4%
15-1133	Software Developers, Systems Software	231	248	17	7%
51-2023	Electromechanical Equipment Assemblers	171	187	16	9%
51-2041	Structural Metal Fabricators and Fitters	46	61	15	33%

49-9041	Industrial Machinery Mechanics	105	120	15	14%		
51-4041	Machinists	509	522	13	3%		
47-2211	Sheet Metal Workers	92	104	12	13%		
51-4031	Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic	123	135	12	10%		
51-9121	Coating, Painting, and Spraying Machine Setters, Operators, and Tenders	106	116	10	9%		
43-9061	Office Clerks, General	68	78	10	15%		
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	100	110	10	10%		
43-4051	Customer Service Representatives	127	136	9	7%		
51-9081	Dental Laboratory Technicians	41	49	8	20%		
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	213	221	8	4%		
13-1161	Market Research Analysts and Marketing Specialists	126	133	7	6%		
51-2011	Aircraft Structure, Surfaces, Rigging, and Systems Assemblers	93	99	6	6%		
13-1081	Logisticians	31	37	6	19%		
53-7064	Packers and Packagers, Hand	34	40	6	18%		
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Market Research

Overall, the Manufacturing and Aerospace Cluster accounts for a little over 4% of the total employment in the State. While the cluster is showing some decline in terms of employment, overall the Manufacturing and Aerospace Cluster continues to be an important sector of the economy. A few specific subsectors stood out as showing potential for the State, including:

- Navigational, Measuring, and Control Instrument Manufacturing
- Aerospace Related Manufacturing
- Medical Device Manufacturing
- Semiconductor and Circuit Manufacturing

The following section provides additional information about these industries.

Navigational, Measuring and Control Instrument Manufacturing (NAICS 33451): This industry primarily manufactures navigational, measuring and control instruments. Its products include aeronautical instruments, appliance regulators and controls (except switches), laboratory analytical instruments, navigation and guidance systems, and physical properties testing equipment. Of particular interest for Vermont is NAICS 334511 Search, Detection, Navigation, Guidance, Aeronautical, and Nautical System and Instrument Manufacturing. Industry subsector Navigational, Measuring, and Control Instrument Manufacturing in Vermont has a national location quotient of 1.83, suggesting that the State has a higher concentration of employees in this industry compared to the national average.

Nationally, the Navigational Instrument Manufacturing industry produces various products, ranging from search, detection and navigational instruments to electricity measuring and testing equipment. The industry has a diverse customer base. Air-traffic controllers, pilots and sea captains use navigational equipment in stationary compasses and electronic guidance systems. Laboratories, spaceships, planes and

buildings employ electricity measuring and testing devices. Physicians and medical researchers use the industry's diagnostic instruments. Because revenue stems from a wide customer base, the industry has experienced only moderate volatility since 2008.

Nationally, industry growth depends on conditions within downstream markets, technology advancements and trade. Companies rely heavily on patents, trademarks, copyrights and trade secrets, as well as confidentiality agreements to establish and protect proprietary technology and new product innovations. In the five years to 2018, industry revenue is forecast to increase at an annualized rate of 2.7% to \$64.6 billion. An increase in R&D funding as a result of expanding budgets will drive product advancement during this period, which will elevate the already strong increase in demand from growing downstream industries. However, industry exports will continue to decline due to an appreciating dollar and lower cost products made abroad, which will weaken revenue growth. These conditions will also help competing imports gain market share, as they will grow from 12.2% to 16.9% of domestic demand.

Examples of companies classified under this industry include L 3 Vertek, BioTek Instruments, Simplex Time Recorder, Bowles Corporation, Senix Corporation, and Asyst Technologies.

The information in this section is sourced directly and solely from IBISWorld.

<u>Aerospace Related Manufacturing (NAICS 33641)</u>: As defined for the Vermont CEDS, companies in this industry manufacture and overhaul complete aircraft, develop prototypes and convert aircraft. The industry also includes the manufacture, conversion and overhaul of aircraft engines and propulsion systems. Additionally, the industry makes related parts and auxiliary equipment. The major products and services of this industry are aircraft, aircraft engines and engine parts, and other aircraft parts and auxiliary equipment. The Aircraft, Engine and Parts Manufacturing industry in Vermont has a national location quotient of 1.15.

The Aerospace industry as defined for the Vermont CEDS had a mixed economic performance over the past couple of years. Overall industry revenue declined during the recent recession (December 2007-June 2009) because of fewer purchases of commercial aircraft and parts from airliners due to lower air travel demand.

According to IBISWorld, the largest industry research firm, demand from domestic and international airlines dropped by 16.3% and 20.6% respectively in 2009 over the previous year. However, in 2010 demand for air travel started to recover, allowing airlines to expand their purchase of aircraft and parts. Foreign demand was particularly strong as growing emerging markets underwent a boom in air travel. Since more than half of the industry's revenue is generated through exports, global demand allowed industry revenue to recover from its recessionary low. As a result, demand from domestic and international airlines has grown steadily since 2009, nearly recovering to its prerecession highs. In particular, demand for the newest, most fuel-efficient planes and engines rose, as airlines sought to mitigate volatile fuel prices and gain an operational advantage.

Demand for military related products remained strong during the recession largely as a result of combat operations in the Middle East, which tempered the overall industry's revenue decline during that period. However, by 2011 falling federal funding pushed revenue in the defense segment down. The end of combat operation in Iraq and budget cuts reduced the amount of money the government allocated towards purchases of military aircraft and related parts.

In the five years to 2018, industry revenue is forecast to rise at an annualized rate of 3.8% to \$209.5 billion. Strong global and domestic demand for commercial aircraft will drive growth, while continued cuts in federal spending for defense will offset some of these gains. Consolidation will also continue, especially in the supply chain, as increased demand encourages the formation of larger suppliers that have the necessary capacity to handle demand.

Examples of companies that fall into this classification include General Electric, G.S. Precision, and Liquid Measurement Systems.

The information in this section is sourced directly and solely from IBISWorld.

<u>Medical Device Manufacturing (NAICS 33451)</u>: This industry includes manufacturers of electromedical and electrotherapeutic apparatus, such as magnetic resonance imaging equipment, medical ultrasound equipment, pacemakers, hearing aids, electrocardiographs and electromedical endoscopic equipment. The industry also manufactures irradiation apparatus and tubes for applications such as medical diagnostic, medical therapeutic, industrial, research and scientific evaluation. This industry in Vermont has a location quotient of 1.83 (same subsector as Navigational Instrument Manufacturing).

Nationally, the recession took a toll on a number of Medical Device Manufacturing firms. Industry revenue plunged 25.6% in 2009, as hospitals struggled to raise capital for large assets and accordingly delayed the purchase of medical equipment. However, the improving economy and technological advances have stimulated demand for medical devices in the years since the recession. The aging U.S. population has further contributed to revenue growth, due to the high incidence of health issues requiring medical devices in the elderly population. Although IBISWorld estimates industry revenue to have decreased at an annualized 3.6% in the five years since 2008, industry revenue is expected to grow 5.5% in 2013, to \$35.2 billion.

Nationally, between 2013 and 2018, industry growth will likely continue, with revenue increasing 7.0% per year on average to \$49.5 billion. The aging baby boomer population and further technological developments will continue to bolster industry growth, but the changing regulatory environment will hamper profitability. The Patient Protection and Affordable Care Act's 2.3% excise tax on the sale of medical devices will continue to drag down average industry profit margins, from 9.0% of revenue in 2013 to about 8.5% in 2018. Planned reform of the approval process for new devices will likely further hinder innovation and encourage more companies to shift some operations overseas.

Examples of companies classified under this industry include Lionheart Technologies and AADCO Medical.

The information in this section is sourced directly and solely from IBISWorld.

<u>Semiconductor and Circuit Manufacturing (NAICS 33441)</u>: As defined for the Vermont CEDS, this industry includes companies that manufacture semiconductors and related devices and parts. Products in this industry include integrated circuits, memory chips, microprocessors, diodes, transistors and other optoelectronic devices. This industry in Vermont has a national location quotient of over 5.50, indicating a very high concentration of employment in the State compared to the rest of the nation.

When considering investment in technology and patents, Vermont has particular strength in technologies for computer and semiconductor related manufacturing technologies related to the IBM plant in Chittenden County. Semiconductor companies in Vermont received \$.75 million in venture capital between 2005 and 2010.⁶⁷

Semiconductors are a basic component of electronic devices and form a vital part of products ranging from electronic devices and systems (e.g. computers, cell phones and televisions) to solutions and services (e.g. internet providers, telecommunications and broadcasting services). The industry is one of the top exporters in the country and, according to the Semiconductor Industry Association (SIA), directly employs 250,000 in the U.S.

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⁶⁷InnovationEconomy360; www.ie360.net/

Nationally, during the five years to 2018, demand from the Computer Manufacturing industry is expected to decline at an annualized rate of 3.9%. Since this industry is a key buyer for the Semiconductor and Circuit Manufacturing industry, sales of microprocessors and central processing units to domestic PC manufacturers are expected to decline. In addition, the price of semiconductor and electronic components is expected to weaken, a result of fierce competition and a struggling global economy. This depression in price will likely cause a reduction in the number of industry operators as they work to maintain profit margins. IBISWorld expects profit margins to stay relatively flat through 2018, although increased production volume will produce higher profit overall.

Nationally, one potential growth market for semiconductors is consumer electronics, such as smartphones, digital cameras and automotive electronics. Sales of semiconductors used in certain consumer electronics are projected to grow over the five years to 2018. Semiconductor vendors with competitive product offerings in the consumer electronics sector will benefit from growth in this market. In addition, semiconductor sales to industrial markets are expected to revive in 2014, as growth in industrial production volume strengthens. The use of electronics in the automotive industry (with regard to safety, comfort and entertainment) is also increasing, due in part to the use of mechanical devices. An overall trend toward automation will sustain some of the industry's growth over the five-year period.

Examples of companies classified under this industry include International Business Machines (IBM), NEHP, Infineon Technologies North America Corporation, and LEDdynamics.

The information in this section is sourced directly and solely from IBISWorld.

Overall Manufacturing Market Trends⁶⁸

The manufacturing environment is changing rapidly and, therefore, economic development approaches must be adapted to be able to help manufacturing thrive and grow in local and regional economies.

Though there have been major decreases in employment nationally in manufacturing in the past 40 years, manufacturing is still a very important part of the economy:

Manufacturing pays higher than average wages;

Success in manufacturing is associated with success in the economic base overall contributing to growth in all sectors;

Manufacturing is an important economic multiplier, and responsible for considerable R&D and exports;

Manufacturing has stopped shedding jobs and is contributing to the recent recovery.

Technology is changing manufacturing:

Declining price of computing power allows small companies to be players in the global market;

Increasing rate of disruptive technologies make it hard to dominate market for an extended period of time—or at all;

3D printing is making it possible for small batch, custom manufacturing.

Opportunities exist in niche manufacturing and at cross-sections of sectors/technologies/processes/and knowledge areas:

⁶⁸ These trends were initially developed as part of Camion's research the development of a re-industrialization strategy for the City of Allentown PA. They are included here as they apply to Vermont manufacturing as context for national and global trends.

Advanced materials composites and bio-manufacturing;

Nano-technology and molecular based manufacturing.

On-shoring and near-shoring are creating new opportunities for U.S. manufacturing, driven by:

Increase in labor costs in China;

Reduced value of U.S. dollar;

Added cost of transportation and logistics and getting product into the hands of end-users;

Increases in American oil and natural gas production are increasing demand for machinery and chemicals and providing lower-cost energy compared to the past;

Lack of quality control and intellectual property protection outside of the US.

Insights from Previous Reports

The following is an overview of information from a review of previous reports as they relate to the Manufacturing and Aerospace Cluster in Vermont.

Vermont Advanced Manufacturing Partnership⁶⁹

Completed in January 2013 by the Agency of Commerce and Community Development, this report focuses on providing recommendations to help strengthen and grow manufacturing in Vermont. The report notes that change in the "face" of manufacturing and how many manufacturing companies are now small, technologically sophisticated with highly skilled workers and global markets. Recommendations include:

- Develop and implement an education model (K-16) to adopt competency-based math standards for students and teachers that can support advanced manufacturing skills development based on models developed by Boston University and the University of Michigan no later than 2014.
- Develop and implement entrepreneurship curricula in Vermont schools and state colleges such
 as Champlain College's "BYOBiz" program. Support and build on the successes and investments
 of the Vermont Manufacturing Extension Center (VMEC) and its federal partner NIST MEP, to
 teach and encourage the use of "Innovation Engineering" as a proven system to accelerate the
 creation and commercialization of meaningfully unique ideas while working with higher
 education in Vermont to develop a post-secondary curriculum modeled after the Innovation
 Engineering degree program at the University of Maine.
- Restore full funding to the Vermont Training Program in the Agency of Commerce and Community Development and create a special fund targeted to upgrading the math skills of Vermont workers.
- Help create an "Innovation Ecosystem" to sustain a culture of ongoing practical research and
 development by developing a non-profit Vermont Advanced Manufacturing Innovation Center
 modeled after the Nanotech Center in New York and the Dartmouth Regional Technical Center
 (DRTC) leveraging the resources of the University of Vermont, Vermont Technical College and
 the other Vermont state colleges, Norwich University and others as appropriate.

⁶⁹ Vermont Advanced Manufacturing Partnership Final Report – January 2014. http://accd.vermont.gov/sites/accd/files/Documents/accd/AMP-Report-2013.pdf

- Develop a "Vermont Innovation Index" with dashboards to monitor trends and compare Vermont to national metrics to measure performance and guide policy and financial investments.
- Study the possibility of creating a Manufacturing Division within the Department of Economic, Housing and Community Development and report back to the Governor and legislature no later than June, 2013.
- Direct ACCD, working with VMEC, to create a low-cost virtual tool for manufacturers to
 exchange information on supply chain issues, excess capacity availability, equipment and space
 sharing, and other general information to connect Vermont's manufacturers.
- Facilitate and accelerate expanded access by Vermont manufacturers to global markets using primarily existing technical assistance resources to help them reach the 95% of consumers who live outside our nation's borders.
- Develop an ongoing public relations campaign to tell the manufacturing story. Strategies could include, but are not limited to:
 - o Promote an annual Manufacturers' Open House and/or Manufacturers' Summit.
 - Create a website and other possible ways to showcase Vermont manufacturers.
 - Encourage local manufacturers in reaching out to local educators and guidance counselors to conduct tours and hold speaking engagements in the classroom.
 - Create annual Innovation Awards for the most exciting research and best practices by Vermont manufacturers.
 - Promote manufacturing speakers for VT National Education Association conventions and local civic organizations such as Rotary International, Lions Clubs, etc. to tell exciting success stories.

Vermont Aerospace & Aviation Association/Manufacturing Sector

The Vermont Aerospace and Aviation Association (VAAA) was founded in 2006 as a part of the Vermont Chamber of Commerce and is charged with representing and serving a network of 250 manufacturers and supply chain partners within the aerospace and aviation industry. The VAAA serves the following industries: Aerospace, Aviation, Automotive, Defense, Energy Services, Utilities, Oil & Gas, Engineering Services, Industrial, Medical Device Manufacturing, Optics, Research & Development, and Telecommunications.⁷⁰

Professional and Technical Services

Cluster Description

The Professional and Technical Services Cluster is made up of services that are provided either to businesses or individuals <u>and</u> require technical skills and expertise to deliver. They include services in custom IT, engineering, architecture, design, marketing, research and development, and management consulting.

⁷⁰ Vermont Chamber of Commerce: Vermont Aerospace & Aviation Association/Manufacturing Sector website. http://www.vtchamber.com/programs/VT_Aerospace-Aviation.aspx/

The following table contains a list of the industries included in this analysis of the Professional and Technical Services Cluster. 71

	Professional and Technical Services
NAICS Code	Description
511210	Software Publishers
541110	Offices of Lawyers
541191	Title Abstract and Settlement Offices
541199	All Other Legal Services
541211	Offices of Certified Public Accountants
541213	Tax Preparation Services
541214	Payroll Services
541219	Other Accounting Services
541310	Architectural Services
541320	Landscape Architectural Services
541330	Engineering Services
541340	Drafting Services
541350	Building Inspection Services
541360	Geophysical Surveying and Mapping Services
541370	Surveying and Mapping (except Geophysical) Services
541380	Testing Laboratories
541410	Interior Design Services
541420	Industrial Design Services
541430	Graphic Design Services
541490	Other Specialized Design Services
541511	Custom Computer Programming Services
541512	Computer Systems Design Services
541513	Computer Facilities Management Services
541519	Other Computer Related Services
541611	Administrative Management and General Management Consulting Services
541612	Human Resources Consulting Services
541613	Marketing Consulting Services
541614	Process, Physical Distribution, and Logistics Consulting Services
541618	Other Management Consulting Services
541620	Environmental Consulting Services
541690	Other Scientific and Technical Consulting Services
541711	Research and Development in Biotechnology
541712	Research and Development in the Physical, Engineering, and Life Sciences (except Biotechnology)
541720	Research and Development in the Social Sciences and Humanities
541810	Advertising Agencies
541820	Public Relations Agencies
541830	Media Buying Agencies
541840	Media Representatives
541850	Display Advertising
541860	Direct Mail Advertising
541870	Advertising Material Distribution Services
541890	Other Services Related to Advertising

⁷¹ Note: several of the sectors included in this cluster are also included in other clusters in particular IT and Energy. They are assessed separately here as part of the Professional and Technical Services Cluster.

541910	Marketing Research and Public Opinion Polling
541921	Photography Studios, Portrait
541922	Commercial Photography
541930	Translation and Interpretation Services
541940	Veterinary Services
541990	All Other Professional, Scientific, and Technical Services
551111	Offices of Bank Holding Companies

Summary and Conclusions

Assets

- Many of the industries in this cluster are associated with small, flexible firms that are able to respond to changing business climates.
- Companies often are able to contract for work out of the State so are able to export their services and bring wealth into the State.
- Some occupations and industries in this cluster can be performed remotely (graphic design services, marketing and research polling, payroll services, engineering services, computer programming services), allowing employees to work for larger firms located elsewhere. The ability to work remotely makes it possible for employees to live where they want without concern for local job market. Vermont's location in the northeast makes it possible for residents to work from home and have the quality of life they desire while still being able to access major markets and work for larger firms.
- Telecommuting and remote work makes it possible for Vermont residents to earn a higher income than otherwise may be possible within the local economy, allowing them to stay in Vermont and invest in the community.
- High income and education levels are associated with this cluster. Growing this cluster would make it possible to attract young professionals to the State.
- The Engineering Services industry is expected to grow as construction rises and demand from
 downstream markets bounces back from the Great Recession. Profit margins should also benefit
 from the rising use of computer-aided design systems that provide cost-effective project
 assessment. This technology will increasingly be used at construction sites via tablet devices,
 improving communication and reducing costs associated with on-site errors.
- The Environmental Consulting Services industry has a high location quotient (2.44) and historic
 and projected growth. This industry fits in with the overall Vermont image and could be a good
 opportunity for the State.
- The Graphic Design Services industry also has a high location quotient (2.15) and might be a
 good fit for the State in terms of attracting creative professionals who are interested in the arts,
 cultural, and community offerings of the State.

Challenges

- Unreliable cell service and broadband access in parts of the state can make it difficult for telecommuting and working remotely. Remote workers must be confident that they will be able to do their work and connect with clients and coworkers with ease. Recent improvements in broadband through Connect VT are addressing this challenge.
- For growth within companies to occur, workforce development is needed to help fill technical positions that demand higher educational attainment.
- Access to major airport and passenger rail is a constraint in part of the state.

Data Findings

Total employment in the Professional and Technical Services Cluster in Vermont totaled 17,955. This represented 5.03% of all employment in Vermont in 2013.

As of 2012, there were 3,030 total establishments in the Professional and Technical Services Cluster in Vermont representing 12.41% of all establishments in Vermont. The average establishment size in the Professional and Technical Services Cluster was 6 employees per establishment, approximately half of the average establishment size of 14.5 in Vermont for all industries.

In terms of industry concentration as measured by national location quotient, industries that have a significantly higher concentration of employment in Vermont compared to the national average include: Veterinary Services (1.37), Graphic Design Services (2.15), Architectural Services (1.45), Environmental Consulting Services (2.44), Landscape Architectural Services (2.13), Surveying and Mapping (except Geophysical) Services (1.41), Display Advertising (1.39), Industrial Design Services (2.17), and some others.

Between 2008 and 2013 the Professional and Technical Services Cluster gained 2% in new employment (279 jobs). Gains were driven by the Administrative Management and General Management Consulting Services (392 new jobs), Engineering Services (285 new jobs), Custom Computer Programming Services (256 new jobs), and Other Scientific and Technical Consulting Services (235 new jobs). The Offices of Lawyers industry lost 493 jobs between 2008 and 2013. Overall the Professional and Technical Services Cluster is expected to grow by 16% between 2013 and 2023, adding 2,822 new jobs. Growth is predicted for the Custom Computer Programming Services industry (607 jobs to be gained), Computer Systems Design Services industry (584 jobs to be gained), Administrative Management and General Management Consulting Services industry (508 jobs to be gained), Engineering Services (465 jobs to be gained), and Other Scientific and Technical Consulting Services industry (321 jobs to be gained).

In 2013 top occupations in the Professional and Technical Services Cluster include Accountants and Auditors (975 jobs), Management Analysts (934 jobs), and Lawyers, (924 jobs).

Between 2013 and 2023 occupation growth in the Professional and Technical Services Cluster is projected to be led by Management Analysts (279 jobs to gained); Software Developers, Applications (188 jobs to be gained); Software Developers, Systems Software (165 jobs to be gained); and Market Research Analysts and Marketing Specialists (123 jobs to be gained).

Wages in the Professional and Technical Services Cluster are higher, on average, compared to the average wages in all industries in Vermont. Most occupations in the Professional and Technical Services Cluster require at least a bachelor's degree.

Existing Conditions

	Professional and Technical Services - Current Employment and Establishments								
NAICS	Description	2013 Jobs	% of Cluster	% of VT Jobs	# of Est.	Emp. per Est.	LQ		
541511	Custom Computer Programming Services	2,198	12.24%	0.62%	331	7	1.15		
541110	Offices of Lawyers	2,136	11.90%	0.60%	419	5	0.72		
541330	Engineering Services	1,674	9.32%	0.47%	258	6	0.74		
541512	Computer Systems Design Services	1,422	7.92%	0.40%	210	7	0.70		
541611	Administrative Management and General Management Consulting Services	1,316	7.33%	0.37%	206	6	0.99		
541940	Veterinary Services	1,053	5.86%	0.29%	126	8	1.37		

541690	Other Scientific and Technical Consulting Services	739	4.12%	0.21%	79	9	1.23
541211	Offices of Certified Public Accountants	718	4.00%	0.20%	140	5	0.68
541219	Other Accounting Services	677	3.77%	0.19%	125	5	0.82
541430	Graphic Design Services	648	3.61%	0.18%	88	7	2.15
541310	Architectural Services	619	3.45%	0.17%	94	7	1.45
541620	Environmental Consulting Services	581	3.24%	0.16%	61	10	2.44
541613	Marketing Consulting Services	523	2.91%	0.15%	130	4	0.91
511210	Software Publishers	297	1.65%	0.08%	34	9	0.43
541320	Landscape Architectural Services	235	1.31%	0.07%	35	7	2.13
541712	Research and Development in the Physical, Engineering, and Life Sciences (except Biotechnology)	234	1.30%	0.07%	49	5	0.22
541618	Other Management Consulting Services	205	1.14%	0.06%	33	6	0.78
541380	Testing Laboratories	183	1.02%	0.05%	26	7	0.47
541612	Human Resources Consulting Services	172	0.96%	0.05%	42	4	0.78
541810	Advertising Agencies	162	0.90%	0.05%	37	4	0.31
541214	Payroll Services	160	0.89%	0.04%	31	5	0.37
541890	Other Services Related to Advertising	160	0.89%	0.04%	29	6	0.79
541370	Surveying and Mapping (except Geophysical) Services	156	0.87%	0.04%	50	3	1.41
541820	Public Relations Agencies	147	0.82%	0.04%	28	5	0.88
541850	Display Advertising	134	0.75%	0.04%	30	4	1.39
541990	All Other Professional, Scientific, and Technical Services	125	0.70%	0.04%	37	3	0.29
541213	Tax Preparation Services	123	0.69%	0.03%	30	4	0.36
541910	Marketing Research and Public Opinion Polling	120	0.67%	0.03%	32	4	0.45
541720	Research and Development in the Social Sciences and Humanities	115	0.64%	0.03%	28	4	0.77
541519	Other Computer Related Services	114	0.63%	0.03%	21	5	0.39
541614	Process, Physical Distribution, and Logistics Consulting Services	110	0.61%	0.03%	34	3	0.40
541420	Industrial Design Services	99	0.55%	0.03%	22	5	2.17
541410	Interior Design Services	87	0.48%	0.02%	15	6	0.47
541340	Drafting Services	84	0.47%	0.02%	10	8	2.15
541350	Building Inspection Services	74	0.41%	0.02%	13	6	1.25
541921	Photography Studios, Portrait	52	0.29%	0.01%	17	3	0.32
541870	Advertising Material Distribution Services	47	0.26%	0.01%	10	5	1.35
541360	Geophysical Surveying and Mapping Services	44	0.25%	0.01%	5	9	0.91
541711	Research and Development in Biotechnology	41	0.23%	0.01%	11	4	0.12
541840	Media Representatives	37	0.21%	0.01%	13	3	0.49

541513	Computer Facilities Management Services	28	0.16%	0.01%	7	4	0.19
541922	Commercial Photography	23	0.13%	0.01%	10	2	0.78
541860	Direct Mail Advertising	22	0.12%	0.01%	2	11	0.16
541490	Other Specialized Design Services	19	0.11%	0.01%	7	3	0.36
541199	All Other Legal Services	17	0.09%	0.00%	9	2	0.27
541930	Translation and Interpretation Services	13	0.07%	0.00%	7	2	0.18
Professional and Technical Cluster Total		17,955	100.00%	5.03%	3,030	6	

Source: QCEW Employees, Non-QCEW Employees & Self-Employed - EMSI 2013.4 Class of Worker Note: Industries with fewer than 10 employees not included

Industry Data *Historic 2008-2013*

	Professional and Technical Services Clu	ster - Histo	ric Growth		
NAICS	Description	2008 Jobs	2013 Jobs	# Change	% Change
541611	Administrative Management and General Management Consulting Services	924	1,316	392	42%
541330	Engineering Services	1,389	1,674	285	21%
541511	Custom Computer Programming Services	1,942	2,198	256	13%
541690	Other Scientific and Technical Consulting Services	504	739	235	47%
541512	Computer Systems Design Services	1,320	1,422	102	8%
541620	Environmental Consulting Services	491	581	90	18%
541320	Landscape Architectural Services	149	235	86	58%
541613	Marketing Consulting Services	447	523	76	17%
541310	Architectural Services	558	619	61	11%
541219	Other Accounting Services	618	677	59	10%
511210	Software Publishers	254	297	43	17%
541340	Drafting Services	43	84	41	95%
541850	Display Advertising	95	134	39	41%
541214	Payroll Services	123	160	37	30%
541350	Building Inspection Services	42	74	32	76%
541820	Public Relations Agencies	121	147	26	21%
541612	Human Resources Consulting Services	149	172	23	15%
541360	Geophysical Surveying and Mapping Services	23	44	21	91%
541840	Media Representatives	27	37	10	37%
541420	Industrial Design Services	98	99	1	1%
541430	Graphic Design Services	647	648	1	0%
541922	Commercial Photography	22	23	1	5%
541711	Research and Development in Biotechnology	43	41	(2)	-5%
541930	Translation and Interpretation Services	19	13	(6)	-32%
541513	Computer Facilities Management Services	36	28	(8)	-22%

541191	Title Abstract and Settlement Offices	16	<10	(11)	-69%
541199	All Other Legal Services	39	17	(22)	-56%
541720	Research and Development in the Social Sciences and Humanities	138	115	(23)	-17%
541618	Other Management Consulting Services	230	205	(25)	-11%
541870	Advertising Material Distribution Services	72	47	(25)	-35%
541410	Interior Design Services	120	87	(33)	-28%
541380	Testing Laboratories	219	183	(36)	-16%
541940	Veterinary Services	1,091	1,053	(38)	-3%
541490	Other Specialized Design Services	62	19	(43)	-69%
541211	Offices of Certified Public Accountants	762	718	(44)	-6%
541370	Surveying and Mapping (except Geophysical) Services	202	156	(46)	-23%
541921	Photography Studios, Portrait	99	52	(47)	-47%
541519	Other Computer Related Services	162	114	(48)	-30%
541614	Process, Physical Distribution, and Logistics Consulting Services	166	110	(56)	-34%
541712	Research and Development in the Physical, Engineering, and Life Sciences (except Biotechnology)	291	234	(57)	-20%
541860	Direct Mail Advertising	84	22	(62)	-74%
541213	Tax Preparation Services	189	123	(66)	-35%
541890	Other Services Related to Advertising	236	160	(76)	-32%
541810	Advertising Agencies	243	162	(81)	-33%
541990	All Other Professional, Scientific, and Technical Services	248	125	(123)	-50%
541910	Marketing Research and Public Opinion Polling	284	120	(164)	-58%
541110	Offices of Lawyers	2,629	2,136	(493)	-19%
Profession	onal and Technical Cluster Total	17,676	17,955	279	2%

Source: QCEW Employees, Non-QCEW Employees & Self-Employed - EMSI 2013.4 Class of Worker Note: Industries with fewer than 10 employees in 2008 and 2013 not included. For industries with fewer than 10 employees in only one year, analyst assumes 5 employees for purposes of calculation.

Projected 2013-2023

	Professional and Technical Services Cluster - Projected Growth						
NAICS	Description	2013 Jobs	2023 Jobs	# Change	% Change		
541511	Custom Computer Programming Services	2,198	2,805	607	28%		
541512	Computer Systems Design Services	1,422	2,006	584	41%		
541611	Administrative Management and General Management Consulting Services	1,316	1,824	508	39%		
541330	Engineering Services	1,674	2,139	465	28%		
541690	Other Scientific and Technical Consulting Services	739	1,060	321	43%		
541620	Environmental Consulting Services	581	868	287	49%		
541940	Veterinary Services	1,053	1,269	216	21%		

541310	Architectural Services	619	785	166	27%
541219	Other Accounting Services	677	780	103	15%
541613	Marketing Consulting Services	523	621	98	19%
541850	Display Advertising	134	213	79	59%
511210	Software Publishers	297	370	73	25%
541820	Public Relations Agencies	147	201	54	37%
541320	Landscape Architectural Services	235	287	52	22%
541430	Graphic Design Services	648	694	46	7%
541350	Building Inspection Services	74	118	44	59%
541420	Industrial Design Services	99	136	37	37%
541340	Drafting Services	84	119	35	42%
541612	Human Resources Consulting Services	172	206	34	20%
541360	Geophysical Surveying and Mapping Services	44	74	30	68%
541211	Offices of Certified Public Accountants	718	741	23	3%
541370	Surveying and Mapping (except Geophysical) Services	156	169	13	8%
541840	Media Representatives	37	48	11	30%
541711	Research and Development in Biotechnology	41	43	2	5%
541922	Commercial Photography	23	22	(1)	-4%
541199	All Other Legal Services	17	14	(3)	-18%
541930	Translation and Interpretation Services	13	10	(3)	-23%
541618	Other Management Consulting Services	205	193	(12)	-6%
541720	Research and Development in the Social Sciences and Humanities	115	103	(12)	-10%
541490	Other Specialized Design Services	19	<10	(14)	-74%
541410	Interior Design Services	87	70	(17)	-20%
541860	Direct Mail Advertising	22	<10	(17)	-77%
541870	Advertising Material Distribution Services	47	27	(20)	-43%
541513	Computer Facilities Management Services	28	<10	(23)	-82%
541614	Process, Physical Distribution, and Logistics Consulting Services	110	87	(23)	-21%
541213	Tax Preparation Services	123	94	(29)	-24%
541712	Research and Development in the Physical, Engineering, and Life Sciences (except Biotechnology)	234	205	(29)	-12%
541380	Testing Laboratories	183	148	(35)	-19%
541519	Other Computer Related Services	114	79	(35)	-31%
541921	Photography Studios, Portrait	52	13	(39)	-75%
541990	All Other Professional, Scientific, and Technical Services	125	64	(61)	-49%
541890	Other Services Related to Advertising	160	95	(65)	-41%
541810	Advertising Agencies	162	92	(70)	-43%
541214	Payroll Services	160	76	(84)	-53%
541910	Marketing Research and Public Opinion Polling	120	14	(106)	-88%
541110	Offices of Lawyers	2,136	1,783	(353)	-17%

Source: QCEW Employees, Non-QCEW Employees & Self-Employed - EMSI 2013.4 Class of Worker Note: Industries with fewer than 10 employees in 2013 and 2023 not included. For industries with fewer than 10 employees in only one year, analyst assumes 5 employees for purposes of calculation.

Occupation Data

Professional and Technical Services Cluster - Occupation Analysis (20 largest)								
SOC	Occupation	2013 Jobs	Annual Wages	Education Required				
13-2011	Accountants and Auditors	975	\$57,160	Bachelor's degree				
13-1111	Management Analysts	934	\$49,320	Bachelor's or higher degree, plus work experience				
23-1011	Lawyers	924	\$70,600	First professional degree				
43-3031	Bookkeeping, Accounting, and Auditing Clerks	610	\$33,200	Moderate-term on-the-job training				
43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	596	\$29,900	Short-term on-the-job training				
15-1151	Computer User Support Specialists	503	\$41,980	Associate's degree				
15-1132	Software Developers, Applications	468	\$74,300	Bachelor's degree				
29-2056	Veterinary Technologists and Technicians	443	\$28,920	Associate's degree				
23-2011	Paralegals and Legal Assistants	435	\$38,320	Associate's degree				
17-1011	Architects, Except Landscape and Naval	409	\$49,360	Bachelor's degree				
13-1161	Market Research Analysts and Marketing Specialists	398	\$47,720	Bachelor's degree				
15-1142	Network and Computer Systems Administrators	378	\$61,240	Bachelor's degree				
27-1024	Graphic Designers	371	\$34,480	Bachelor's degree				
15-1133	Software Developers, Systems Software	363	\$88,980	Bachelor's degree				
11-1021	General and Operations Managers	288	\$79,200	Bachelor's or higher degree, plus work experience				
17-2051	Civil Engineers	279	\$60,440	Bachelor's degree				
41-3099	Sales Representatives, Services, All Other	259	\$43,780	Short-term on-the-job training				
43-6011	Executive Secretaries and Executive Administrative Assistants	238	\$43,040	Work experience in a related occupation				
29-1131	Veterinarians	237	\$71,800	First professional degree				
43-6012	Legal Secretaries	231	\$34,440	Postsecondary non-degree award				

Source: QCEW Employees, Non-QCEW Employees & Self-Employed - EMSI 2013.4 Class of Worker

Note: Annual wages based on 2,000 hours per

year

Historic 2008-2013

Professional and Technical Services Cluster - Historic Occupation Growth (Top 20 Largest Growth)								
SOC	Occupation	2008 Jobs	2013 Jobs	# Change	% Change			
Total	All Cluster Occupations	16,928	17,220	292	2%			
13-1111	Management Analysts	749	934	185	25%			
13-1161	Market Research Analysts and Marketing Specialists	318	398	80	25%			
17-1011	Architects, Except Landscape and Naval	332	409	77	23%			
15-1133	Software Developers, Systems Software	294	363	69	23%			
17-2051	Civil Engineers	216	279	63	29%			
15-1151	Computer User Support Specialists	441	503	62	14%			
15-1132	Software Developers, Applications	409	468	59	14%			
29-2056	Veterinary Technologists and Technicians	384	443	59	15%			
15-1142	Network and Computer Systems Administrators	336	378	42	13%			
17-2199	Engineers, All Other	48	89	41	85%			
47-4011	Construction and Building Inspectors	89	127	38	43%			
19-2041	Environmental Scientists and Specialists, Including Health	193	228	35	18%			
13-1151	Training and Development Specialists	79	102	23	29%			
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	69	90	21	30%			
13-1041	Compliance Officers	81	100	19	23%			
15-1152	Computer Network Support Specialists	131	149	18	14%			
11-9041	Architectural and Engineering Managers	134	150	16	12%			
15-1134	Web Developers	174	189	15	9%			
17-3031	Surveying and Mapping Technicians	83	98	15	18%			
43-6011	Executive Secretaries and Executive Administrative Assistants	224	238	14	6%			

Source: QCEW Employees, Non-QCEW Employees & Self-Employed - EMSI 2013.4 Class of

Worker

Projected 2013-2023

Professional and Technical Services Cluster - Projected Occupation Growth (Top 20 Largest Growth)								
SOC	Occupation	2013 Jobs	2023 Jobs	# Change	% Change			
Total	All Cluster Occupations	17,220	20,016	2,796	16%			
13-1111	Management Analysts	934	1,213	279	30%			
15-1132	Software Developers, Applications	468	656	188	40%			
15-1133	Software Developers, Systems Software	363	528	165	45%			
13-1161	Market Research Analysts and Marketing Specialists	398	521	123	31%			
17-1011	Architects, Except Landscape and Naval	409	524	115	28%			
29-2056	Veterinary Technologists and Technicians	443	548	105	24%			
15-1151	Computer User Support Specialists	503	607	104	21%			
17-2051	Civil Engineers	279	375	96	34%			

15-1121	Computer Systems Analysts	184	267	83	45%
15-1142	Network and Computer Systems Administrators	378	453	75	20%
41-3099	Sales Representatives, Services, All Other	259	328	69	27%
13-2011	Accountants and Auditors	975	1,034	59	6%
43-9061	Office Clerks, General	162	220	58	36%
47-4011	Construction and Building Inspectors	127	183	56	44%
43-4051	Customer Service Representatives	191	245	54	28%
15-1131	Computer Programmers	207	259	52	25%
11-1021	General and Operations Managers	288	339	51	18%
17-2199	Engineers, All Other	89	139	50	56%
11-3021	Computer and Information Systems Managers	180	230	50	28%
13-1199	Business Operations Specialists, All Other	115	160	45	39%

Source: QCEW Employees, Non-QCEW Employees & Self-Employed - EMSI 2013.4 Class of

Worker

Market Research

As highlighted above in the data section of this analysis, the Professional and Technical Services Cluster accounts for 5% of the total employment in the State, it has seen growth of 2% over the last five years and is projected to continue to grow by 16% over the next 10 years. Furthermore, the average wages for occupations within this cluster are high and would attract professionals to the State.

Additional market research was conducted into the following subsectors of the Professional and Technical Services Cluster:

- Engineering Services
- Management Consulting Services
- IT Consulting

The following section provides additional information about these industries.

<u>Engineering Services (NAICS 54133)</u>: Companies categorized as providing engineering services apply the physical laws and principles of engineering in designing, developing and using machines, materials, instruments, structures, processes and systems. These services may involve providing advice, preparing feasibility studies, preparing plans and designs, providing technical services during the construction or installation phase, inspecting and evaluating engineering projects and providing other related services. The Engineering Services industry has a location quotient of 0.74, indicating jobs in this industry are less concentrated than the national average.

The Engineering Services industry is fragmented, with a large number of small-scale operators that often provide services to regional markets or specialized niches. About two-thirds of firms are nonemployers, which were hit particularly hard by the reduction in demand following the recession. As a result, many of these small firms were forced to leave the industry in 2009 and 2010. Firms have begun to reenter as business conditions have improved over the past two years. Consequently, the number of enterprises is expected to grow at an annualized rate of 0.8% to 141,639 in the five years to 2013.

Between 2013 and 2018, the industry is anticipated to grow as the economy recovers, the value of construction rises and demand from key downstream markets revives. Revenue is forecast to increase at an average rate of 2.9% per year to total \$230.6 billion by 2018. Profitability is forecast to improve slightly, especially among large operators that provide high-margin services, such as construction

management. Profit margins should also benefit from the rising use of computer-aided design systems that provide cost-effective project assessment. This technology will increasingly be used at construction sites via tablet devices, improving communication and reducing costs associated with on-site errors.

Examples of companies classified under NAICS 54330 – Engineering Services include Simmonds Precision Products, Stantec Consulting Services, Otter Creek Engineering, Griffin International, and R.O.V Technologies, Inc.

The information in this section is sourced directly and solely from IBISWorld.

Management Consulting (NAICS 54161): Management consultants advise businesses, nonprofits and public-sector agencies in the following areas: organizational design, human resources, corporate strategy, information technology strategy, marketing and sales, finances and logistics. This industry excludes establishments providing day-to-day administrative services and establishments that are concentrated in recruitment, training, public relations, market research, engineering design, computer systems design and investment advice. The Management Consulting industry has a national location quotient of 0.87.

After tepid growth over the past few years, the Management Consulting industry is poised to make a recovery in 2013 with expected revenue growth of 5.4% during the year. The industry includes firms that provide assistance to private, public and nonprofit institutions on issues ranging from strategic organization to human resources planning. With more than 90.0% of industry revenue coming from consulting contracts with private businesses, industry performance is largely driven by the level of corporate profit and the number of businesses in the United States.

As corporate profit has recovered, so have industry prospects. In 2013, industry revenue is expected to rise, driven by increased corporate spending. Corporations that survived the economic downturn but delayed consulting expenditures will reinvest profit in business strategy updates, human resources and information technology infrastructure. As a result, industry revenue is expected to grow at an annualized rate of 3.5% over the next five years, increasing to \$203.7 billion in 2018. Over the same period, employment is expected to increase at an annualized rate of 3.1%, as consultancies hire to meet rising demand.

Examples of companies in Vermont classified under this cluster include TPW Management, Medical Business Administration Resources, Resource Systems Group, Maximus Inc, and Paper Trail Solutions.

<u>IT Consulting (NAICS 54151)</u>: This industry sector falls under both the Information Technology Cluster and the Professional the Technical Services Cluster. Please see Information Technology Market Research section for more information.

The information in this section is sourced directly and solely from IBISWorld.

Insights from Previous Reports

A review of previous reports was conducted and there were no specific recommendations related to this cluster.

Tourism and Culture Cluster

Cluster Description

The Tourism and Culture Cluster is clearly important to Vermont in terms of the businesses that are supported by visitors and the amount of money that is spent by visitors throughout the state each year. This cluster includes lodging facilities, restaurants, cultural offerings, and scenic transportation industries. Vermont is well known for its skiing and winter recreation facilities, but it is the year round activities that provide the largest number of visitors to the State. Access to natural resources, outdoor recreation, and scenic landscapes attracts many tourists each year in search of the "Vermont Experience".

A challenge for Vermont related to this cluster is that a majority of the occupations related to tourism and culture are not well paying and are either seasonal or part time. Tourism will always been an important part of the Vermont economy, but work needs to be done to raise the level of wages to improve the quality of life for employees and improve the overall economy throughout the year.

The following table contains a list of the industries included in this analysis of the Tourism and Culture Cluster.

	Tourism and Culture Cluster				
NAICS	Description				
Code	·				
114210	Hunting and Trapping				
487110	Scenic and Sightseeing Transportation, Land				
487210	Scenic and Sightseeing Transportation, Water				
487990	Scenic and Sightseeing Transportation, Other				
512131	Motion Picture Theaters (except Drive-Ins)				
512132	Drive-In Motion Picture Theaters				
561510	Travel Agencies				
561520	Tour Operators				
561591	Convention and Visitors Bureaus				
561599	All Other Travel Arrangement and Reservation Services				
711110	Theater Companies and Dinner Theaters				
711120	Dance Companies				
711130	Musical Groups and Artists				
711190	Other Performing Arts Companies				
711212	Racetracks				
711510	Independent Artists, Writers, and Performers				
712110	Museums				
712120	Historical Sites				
712130	Zoos and Botanical Gardens				
712190	Nature Parks and Other Similar Institutions				
713110	Amusement and Theme Parks				
713120	Amusement Arcades				
713910	Golf Courses and Country Clubs				
713920	Skiing Facilities				
713930	Marinas				
713940	Fitness and Recreational Sports Centers				
713950	Bowling Centers				
713990	All Other Amusement and Recreation Industries				
721110	Hotels (except Casino Hotels) and Motels				

721120	Casino Hotels
721191	Bed-and-Breakfast Inns
721199	All Other Traveler Accommodation
721211	RV (Recreational Vehicle) Parks and Campgrounds
721214	Recreational and Vacation Camps (except Campgrounds)
722110	Full-Service Restaurants
722211	Limited-Service Restaurants
722212	Cafeterias, Grill Buffets, and Buffets
722213	Snack and Nonalcoholic Beverage Bars

Summary and Conclusions

Assets

- Increased use of natural resources for hiking, camping, adventure trips, and other types of recreation that is minimally disruptive to the natural environment
- Decreased distance and length of vacations people are taking will make Vermont a more likely destination for those coming from within a few hours and looking for a close weekend-trip destination
- Increased interest in adventure races and other recreation events could draw people to Vermont throughout the year
- Outdoor recreation and arts fit well with overall Made in Vermont brand and image
- Historically strong growth in the hospitality industries (hotels, restaurants, etc.) with growth expected to continue
- Potential to grow the recognition for non-winter tourism in Vermont including kayaking, fishing, hunting, mountain biking, etc.
- Many recreational assets available in Vermont are considered to be "gateway activities", which
 are those activities that are affordable and accessible and tend to lead to participation in other
 outdoor recreation such as hiking, camping (car, backyard, RV), bicycling, fishing, trail running,
 etc.
- 49% of New Englanders over the age of 6 participate in outdoor activities
- Food related tourism can benefit both food/agriculture and tourism industry, Vermont has a high quality reputation in both
- Tourism services, amenities, and facilities benefit out of state tourists as well as residents

Challenges

- Climate change and extreme weather impacting tourism facilities and consumer preferences
- Change in consumer preferences away from golfing and skiing towards less cost prohibitive activities
- 37% of Americans over the age of 6 do not participate in outdoor activities due to a lack of interest. Even more concerning is the lack of interest in youth, 45% of youth ages 13 to 17 do not participate in outdoor activities because of a lack of interest
- Low wages, seasonality, and high turnover of occupations in this cluster

Data Findings

Employment in the Tourism and Culture Cluster in Vermont totaled 33,594 in 2013. This cluster represents 9.41% of all employment in Vermont in 2013.

In 2012, there were 1,995 total establishments in the Tourism and Culture Cluster in Vermont representing 8.17% of all establishments in the state. On average, establishments in the Tourism and Culture Cluster have 17 employees, similar to the average establishment size of 14.5 in Vermont for all industries.

In terms of industry concentration as measured by national location quotient, industries that show a significant level of concentration compared to the national average include: Hotels (2.97), Independent Artists, Writers, and Performers (1.43), Museums (2.33), Bed-and Breakfast Inns (6.93), Skiing Facilities (4.97), Recreational and Vacation Camps (except Campgrounds) (2.81), Theater Companies and Dinner Theater (1.49), Other Performing Arts Companies (2.78), Convention and Visitors Bureaus (2.31), and Scenic and Sightseeing Transportation (1.71).

The Tourism and Culture Cluster saw a 3% growth in employment between 2008 and 2013 (1,012 jobs). Growth was driven by the Hotel industry (534 new jobs), Limited-Service Restaurant industry (422 jobs added), and Full-Service Restaurants (326 jobs added). Bed-and-Breakfast Inns loss 287 jobs, Independent Artists, Writers, and Performers declined by 168 jobs, and Snack and Nonalcoholic Beverage Bars lost 128 jobs between 2008 and 2013. Overall, the Tourism and Culture Cluster is projected to increase employment by 4% (1,408 jobs) between 2013 and 2023.

Occupations with the largest number of jobs in 2013 for the Tourism and Culture Cluster include Waiters and Waitresses (4,213 jobs), Combined Food Preparation and Serving Workers, Including Fast Food (3,806 jobs), Maids and Housekeeping Cleaners (2,499 jobs), and Cooks, Restaurant (2,220 jobs).

Between 2013 and 2023, occupation growth in the Tourism and Culture is projected to be driven by Waiters and Waitresses (306 jobs to be gained), Cooks, Restaurant (228 jobs to be gained), Maids and Housekeeping Cleaners (208 jobs to be gained), and Combined Food Preparation and Serving Workers, Including Fast Food (161 jobs to be gained).

Wages in the Tourism and Culture Cluster are on average lower than wages in all industries in Vermont. None of the top 20 largest occupations had higher than the average for Vermont (average of approximately \$38,500) as a whole in 2013. Most occupations in the Tourism and Culture Cluster require no higher than on-the-job training.

Existing Conditions

	Tourism and Culture Cluster - Current Employment and Establishments									
NAICS	Description	2013 Jobs	% of Cluster	% of VT Jobs	# of Est.	Emp. per Est.	LQ			
722110	Full-Service Restaurants	10,669	31.76%	2.99%	681	16	0.88			
721110	Hotels (except Casino Hotels) and Motels	10,340	30.78%	2.90%	240	43	2.97			
722211	Limited-Service Restaurants	4,760	14.17%	1.33%	364	13	0.49			
713940	Fitness and Recreational Sports Centers	1,369	4.08%	0.38%	86	16	0.94			
711510	Independent Artists, Writers, and Performers	1,291	3.84%	0.36%	60	22	1.43			
722213	Snack and Nonalcoholic Beverage Bars	890	2.65%	0.25%	93	10	0.56			
713910	Golf Courses and Country Clubs	774	2.30%	0.22%	46	17	0.92			

Target Sector & Cluster Analysis – Appendix D

740440	Maria	407	4.000/	0.400/	0.4	40	0.00
712110	Museums	467	1.39%	0.13%	24	19	2.33
721191	Bed-and-Breakfast Inns	412	1.23%	0.12%	98	4	6.93
713920	Skiing Facilities	408	1.21%	0.11%	14	29	4.97
713990	All Other Amusement and Recreation Industries	336	1.00%	0.09%	60	6	0.84
512131	Motion Picture Theaters (except Drive-Ins)	262	0.78%	0.07%	19	14	0.79
721214	Recreational and Vacation Camps (except Campgrounds)	230	0.68%	0.06%	19	12	2.81
711110	Theater Companies and Dinner Theaters	198	0.59%	0.06%	16	12	1.49
713950	Bowling Centers	193	0.57%	0.05%	16	12	1.23
561520	Tour Operators	167	0.50%	0.05%	22	8	2.89
561510	Travel Agencies	156	0.46%	0.04%	25	6	0.54
713930	Marinas	94	0.28%	0.03%	11	9	0.89
711212	Racetracks	76	0.23%	0.02%	4	19	0.80
721211	RV (Recreational Vehicle) Parks and Campgrounds	74	0.22%	0.02%	39	2	1.04
561599	All Other Travel Arrangement and Reservation Services	58	0.17%	0.02%	9	6	0.19
722212	Cafeterias, Grill Buffets, and Buffets	55	0.16%	0.02%	6	9	0.20
711130	Musical Groups and Artists	51	0.15%	0.01%	8	6	0.42
711190	Other Performing Arts Companies	45	0.13%	0.01%	2	23	2.78
712120	Historical Sites	45	0.13%	0.01%	5	9	1.27
713110	Amusement and Theme Parks	38	0.11%	0.01%	3	13	0.14
561591	Convention and Visitors Bureaus	29	0.09%	0.01%	4	7	2.31
487210	Scenic and Sightseeing Transportation, Water	25	0.07%	0.01%	2	13	0.58
721199	All Other Traveler Accommodation	22	0.07%	0.01%	6	4	
487110	Scenic and Sightseeing Transportation, Land	19	0.06%	0.01%	2	10	0.86
713120	Amusement Arcades	14	0.04%	0.00%	5	3	0.29
487990	Scenic and Sightseeing Transportation, Other	12	0.04%	0.00%	4	3	1.71
Tourism	and Culture Cluster Total	33,594	100.00%	9.41%	1,995	17	

Source: QCEW Employees, Non-QCEW Employees & Self-Employed - EMSI 2013.4 Class of Worker Note: Industries with fewer than 10 employees not included

Industry Data

Historic 2008-2013

Tourism and Culture Cluster - Historic Growth							
NAICS	Description	2008 Jobs	2013 Jobs	# Change	% Change		
721110	Hotels (except Casino Hotels) and Motels	9,806	10,340	534	5%		
722211	Limited-Service Restaurants	4,338	4,760	422	10%		

722110	Full-Service Restaurants	10,343	10,669	326	3%
713940	Fitness and Recreational Sports Centers	1,232	1,369	137	11%
713910	Golf Courses and Country Clubs	708	774	66	9%
713920	Skiing Facilities	371	408	37	10%
713110	Amusement and Theme Parks	<10	38	33	660%
712110	Museums	436	467	31	7%
561591	Convention and Visitors Bureaus	<10	29	24	480%
711130	Musical Groups and Artists	27	51	24	89%
713950	Bowling Centers	169	193	24	14%
711110	Theater Companies and Dinner Theaters	175	198	23	13%
561599	All Other Travel Arrangement and Reservation Services	41	58	17	41%
711190	Other Performing Arts Companies	29	45	16	55%
712120	Historical Sites	29	45	16	55%
487110	Scenic and Sightseeing Transportation, Land	<10	19	14	280%
561520	Tour Operators	155	167	12	8%
713930	Marinas	82	94	12	15%
713990	All Other Amusement and Recreation Industries	326	336	10	3%
722212	Cafeterias, Grill Buffets, and Buffets	45	55	10	22%
713120	Amusement Arcades	<10	14	9	180%
711212	Racetracks	68	76	8	12%
721199	All Other Traveler Accommodation	22	22	0	0%
487990	Scenic and Sightseeing Transportation, Other	17	12	(5)	-29%
487210	Scenic and Sightseeing Transportation, Water	42	25	(17)	-40%
561510	Travel Agencies	180	156	(24)	-13%
512131	Motion Picture Theaters (except Drive-Ins)	293	262	(31)	-11%
721211	RV (Recreational Vehicle) Parks and Campgrounds	107	74	(33)	-31%
721214	Recreational and Vacation Camps (except Campgrounds)	311	230	(81)	-26%
722213	Snack and Nonalcoholic Beverage Bars	1,018	890	(128)	-13%
711510	Independent Artists, Writers, and Performers	1,459	1,291	(168)	-12%
721191	Bed-and-Breakfast Inns	699	412	(287)	-41%
Tourism	and Culture Cluster Total	32,582	33,594	1,012	3%

Source: QCEW Employees, Non-QCEW Employees & Self-Employed - EMSI 2013.4 Class of Worker Note: Industries with fewer than 10 employees in 2008 and 2013 not included. For industries with fewer than 10 employees in only one year, analyst assumes 5 employees for purposes of calculation.

Projected 2013-2023

	Tourism and Culture Cluster - Projected Growth							
NAICS	Description	2013 Jobs	2023 Jobs	# Change	% Change			
721110	Hotels (except Casino Hotels) and Motels	10,340	11,115	775	7%			
722110	Full-Service Restaurants	10,669	11,313	644	6%			

722211	Limited-Service Restaurants	4,760	4,903	143	3%
713910	Golf Courses and Country Clubs	774	895	121	16%
713920	Skiing Facilities	408	483	75	18%
711110	Theater Companies and Dinner Theaters	198	262	64	32%
713940	Fitness and Recreational Sports Centers	1,369	1,417	48	4%
713990	All Other Amusement and Recreation Industries	336	381	45	13%
561520	Tour Operators	167	203	36	22%
712110	Museums	467	501	34	7%
561591	Convention and Visitors Bureaus	29	60	31	107%
711190	Other Performing Arts Companies	45	70	25	56%
713110	Amusement and Theme Parks	38	60	22	58%
712120	Historical Sites	45	57	12	27%
721214	Recreational and Vacation Camps (except Campgrounds)	230	241	11	5%
487110	Scenic and Sightseeing Transportation, Land	19	29	10	53%
721211	RV (Recreational Vehicle) Parks and Campgrounds	74	80	6	8%
722212	Cafeterias, Grill Buffets, and Buffets	55	60	5	9%
487210	Scenic and Sightseeing Transportation, Water	25	26	1	4%
487990	Scenic and Sightseeing Transportation, Other	12	13	1	8%
713120	Amusement Arcades	14	15	1	7%
713950	Bowling Centers	193	190	(3)	-2%
711130	Musical Groups and Artists	51	47	(4)	-8%
713930	Marinas	94	89	(5)	-5%
711212	Racetracks	76	65	(11)	-14%
561599	All Other Travel Arrangement and Reservation Services	58	44	(14)	-24%
721199	All Other Traveler Accommodation	22	<10	(17)	-77%
512131	Motion Picture Theaters (except Drive-Ins)	262	240	(22)	-8%
722213	Snack and Nonalcoholic Beverage Bars	890	854	(36)	-4%
561510	Travel Agencies	156	115	(41)	-26%
721191	Bed-and-Breakfast Inns	412	250	(162)	-39%
711510	Independent Artists, Writers, and Performers	1,291	917	(374)	-29%
Tourism	and Culture Cluster Total	33,594	35,002	1,408	4%

Source: QCEW Employees, Non-QCEW Employees & Self-Employed - EMSI 2013.4 Class of Worker Note: Industries with fewer than 10 employees in 2013 and 2023 not included. For industries with fewer than 10 employees in only one year, analyst assumes 5 employees for purposes of calculation.

Occupation Data

Tourism and Culture Cluster - Occupation Analysis (20 largest)							
SOC	Occupation	2013 Jobs	Annual Wages	Education Required			
35-3031	Waiters and Waitresses	4,213	\$19,060	Short-term on-the-job training			

35-3021	Combined Food Preparation and Serving Workers, Including Fast Food	3,868	\$19,080	Short-term on-the-job training
37-2012	Maids and Housekeeping Cleaners	2,499	\$19,320	Short-term on-the-job training
35-2014	Cooks, Restaurant	2,220	\$25,680	Moderate-term on-the-job training
35-9021	Dishwashers	1,374	\$18,740	Short-term on-the-job training
35-1012	First-Line Supervisors of Food Preparation and Serving Workers	1,178	\$33,640	Work experience in a related occupation
35-3011	Bartenders	1,154	\$21,980	Short-term on-the-job training
43-4081	Hotel, Motel, and Resort Desk Clerks	999	\$22,240	Short-term on-the-job training
49-9071	Maintenance and Repair Workers, General	843	\$33,840	Moderate-term on-the-job training
35-2021	Food Preparation Workers	834	\$20,620	Short-term on-the-job training
35-3022	Counter Attendants, Cafeteria, Food Concession, and Coffee Shop	683	\$18,440	Short-term on-the-job training
41-2011	Cashiers	641	\$19,160	Short-term on-the-job training
37-3011	Landscaping and Groundskeeping Workers	575	\$24,440	Short-term on-the-job training
37-2011	Janitors and Cleaners, Except Maids and Housekeeping Cleaners	517	\$23,820	Short-term on-the-job training
39-9031	Fitness Trainers and Aerobics Instructors	515	\$29,240	Postsecondary non-degree award
35-9031	Hosts and Hostesses, Restaurant, Lounge, and Coffee Shop	496	\$18,980	Short-term on-the-job training
35-9011	Dining Room and Cafeteria Attendants and Bartender Helpers	484	\$19,120	Short-term on-the-job training
43-3031	Bookkeeping, Accounting, and Auditing Clerks	443	\$33,200	Moderate-term on-the-job training
35-1011	Chefs and Head Cooks	418	\$35,540	Work experience in a related occupation
35-2011	Cooks, Fast Food	354	\$20,200	Short-term on-the-job training

Source: QCEW Employees, Non-QCEW Employees & Self-Employed - EMSI 2013.4 Class of Worker

Note: Annual wages based on 2,000 hours per

year

Historic 2008-2013

Tourism and Culture Cluster - Historic Occupation Growth (Top 20 Largest Growth)									
SOC	Occupation	2008 Jobs	2013 Jobs	# Change	% Change				
Total	All Cluster Occupations	32,098	33,085	987	3%				
35-3021	Combined Food Preparation and Serving Workers, Including Fast Food	3,634	3,868	234	6%				
35-3031	Waiters and Waitresses	4,064	4,213	149	4%				

35-2014	Cooks, Restaurant	2,098	2,220	122	6%
37-2012	Maids and Housekeeping Cleaners	2,397	2,499	102	4%
39-9031	Fitness Trainers and Aerobics Instructors	453	515	62	14%
35-1012	First-Line Supervisors of Food Preparation and Serving Workers	1,124	1,178	54	5%
35-2021	Food Preparation Workers	784	834	50	6%
43-4081	Hotel, Motel, and Resort Desk Clerks	953	999	46	5%
39-3091	Amusement and Recreation Attendants	275	315	40	15%
35-9021	Dishwashers	1,343	1,374	31	2%
49-9071	Maintenance and Repair Workers, General	816	843	27	3%
27-2022	Coaches and Scouts	270	293	23	9%
37-3011	Landscaping and Groundskeeping Workers	554	575	21	4%
35-3011	Bartenders	1,136	1,154	18	2%
39-7011	Tour Guides and Escorts	187	205	18	10%
41-2011	Cashiers	624	641	17	3%
37-2011	Janitors and Cleaners, Except Maids and Housekeeping Cleaners	502	517	15	3%
27-4021	Photographers	74	89	15	20%
35-3022	Counter Attendants, Cafeteria, Food Concession, and Coffee Shop	669	683	14	2%
43-3031	Bookkeeping, Accounting, and Auditing Clerks	429	443	14	3%

Source: QCEW Employees, Non-QCEW Employees & Self-Employed - EMSI 2013.4 Class of Worker

Projected 2013-2023

	Tourism and Culture Cluster - Projected Occ	upation Grov	wth (Top 20	Largest Gro	wth)
SOC	Occupation	2013 Jobs	2023 Jobs	# Change	% Change
Total	All Cluster Occupations	33,085	34,399	1,314	4%
35-3031	Waiters and Waitresses	4,213	4,519	306	7%
35-2014	Cooks, Restaurant	2,220	2,448	228	10%
37-2012	Maids and Housekeeping Cleaners	2,499	2,707	208	8%
35-3021	Combined Food Preparation and Serving Workers, Including Fast Food	3,868	4,029	161	4%
43-4081	Hotel, Motel, and Resort Desk Clerks	999	1,096	97	10%
35-2021	Food Preparation Workers	834	911	77	9%
35-1012	First-Line Supervisors of Food Preparation and Serving Workers	1,178	1,247	69	6%
49-9071	Maintenance and Repair Workers, General	843	907	64	8%
37-3011	Landscaping and Groundskeeping Workers	575	639	64	11%
39-3091	Amusement and Recreation Attendants	315	361	46	15%
35-9021	Dishwashers	1,374	1,416	42	3%

39-9031	Fitness Trainers and Aerobics Instructors	515	556	41	8%
37-2011	Janitors and Cleaners, Except Maids and Housekeeping Cleaners	517	544	27	5%
43-3031	Bookkeeping, Accounting, and Auditing Clerks	443	470	27	6%
35-3011	Bartenders	1,154	1,177	23	2%
13-1121	Meeting, Convention, and Event Planners	134	156	22	16%
39-7011	Tour Guides and Escorts	205	225	20	10%
35-9011	Dining Room and Cafeteria Attendants and Bartender Helpers	484	504	20	4%
41-2011	Cashiers	641	660	19	3%
33-9032	Security Guards	268	287	19	7%

Source: QCEW Employees, Non-QCEW Employees & Self-Employed - EMSI 2013.4 Class of

Worker

Market Research

The Tourism and Culture Cluster accounts for nearly 10% of the total employment in the state, with the largest industry being Full-Service Restaurants (10,669 jobs in 2013) followed by Hotels (10,340 jobs in 2013). Vermont is well positioned to capture increased visitors as people are starting to take shorter vacations that are closer to home (within driving distance) rather than long vacations that require a flight, cost more money, and require more time away from work. Research also suggests that Northern New England (Vermont, New Hampshire, and Maine) experienced a smaller decline in visitation after 9/11, possibility reflecting and interest by visitors in places where "abundant recreation and vacation destination opportunities exist, and where a different pace of life offers the opportunity to escape the major urban areas of the Northeast United States". ⁷²

Climate change and extreme weather may have a negative impact on the Tourism and Culture Cluster for Vermont as much of it is reliant on predicable weather conditions (skiing, boating, hiking, etc.). Research conducted by the Natural Resources Defense Council and Protect Our Winters on the impact of climate change on winter tourism suggests that during lower-snowfall years, Vermont sees 9% fewer skier visits. Additionally, the report states that Vermont's 2009/2010 winter tourism supported 13,417 employees and added \$771 million to the state's economy. Skiing is only one aspect of the state's Tourism and Culture Cluster, but it is clear that climate change could have a large impact on the cluster and the overall economy.

A report on outdoor recreation participation by the Outdoor Foundation notes that in 2012 outdoor recreation reached the highest participation level in five years. Running, jogging, and trail running are the most popular outdoor activities, with almost 51 million participants. Recreational kayaking, bow hunting, freestyle skiing, stand up paddling, and downhill telemarking saw the largest percent increase in participation over the last five years. Freestyle skiing, downhill telemarking, snowshoeing, recreational kayaking, and traditional/road triathlon saw the largest percent increase in participation in the last three years.⁷⁴

⁷² Warnick, R. Travel Trends in New England and the Northeast United States: Updated Post 9-11 Trends. http://www.nrs.fs.fed.us/pubs/gtr_nrs-p-23papers/24warnick-p23.pdf

⁷³ Climate Impacts on the Winter Tourism Economy in the United States. Prepared by the NRDC and ProtectOurWinters.org. http://www.nrdc.org/globalwarming/files/climate-impacts-winter-tourism-report.pdf
⁷⁴Outdoor Recreation Participation Report 2012. Prepared by Outdoor Foundation.

Mountain biking is a growing sector of the outdoor recreation economy that could be further promoted in Vermont. Many of the ski mountains are offering mountain biking during the off-season and that could be further promote through linkages, connections, tours, and trips. A 2012 report written by the Outdoor Industry entitled *The Outdoor Recreation Economy* notes that Americans spend more on bicycling gear and trips (\$81 billion) than they do on airplane tickets and fees (\$51 billion). Their research also states that the outdoor recreation economy grew approximately 5% between 2005 and 2011, during the economic recession, when many other sectors contracted.⁷⁵

Examples of companies operating within this cluster include Equinox Holdings, Killington/Pico Ski Resort, West River Marina, Red Mill Restaurant, Bike Vermont, Finer Vermont Tours, Gateway Travel, The Bennington Arts Guild, Vermont Granite Museum of Barre, Vermont Symphony Orchestra Association, Jericho Historical Society, and Manchester Country Club.

Insights from Previous Reports

A review of previous reports was conducted and there were no specific recommendations related to this cluster; however, it is clear that the natural resources and tourism industries play a large role in the values that Vermonters hold important.

Business, Finance, and Insurance

Cluster Description

The Business, Finance, and Insurance Cluster is made up of industries from the Finance and Insurance sector (NAICS 52) and the Real Estate and Rental Leasing sector (NAICS 53). Industries in this cluster are engaged in financial transactions and/or facilitating those transactions as well as establishments involved in renting and leasing tangible or intangible assets.

The following is the list of the industries included in this analysis of the Business, Finance, and Insurance Cluster.

	Business, Finance, and Insurance Cluster				
NAICS Code	Description				
521110	Monetary Authorities-Central Bank				
522110	Commercial Banking				
522120	Savings Institutions				
522130	Credit Unions				
522190	Other Depository Credit Intermediation				
522210	Credit Card Issuing				
522220	Sales Financing				
522291	Consumer Lending				
522292	Real Estate Credit				
522293	International Trade Financing				
522294	Secondary Market Financing				
522298	All Other Nondepository Credit Intermediation				
522310	Mortgage and Nonmortgage Loan Brokers				
522320	Financial Transactions Processing, Reserve, and Clearinghouse Activities				
522390	Other Activities Related to Credit Intermediation				

⁷⁵ The Outdoor Recreation Economy. Prepared by Outdoor Industry Association. http://www.outdoorindustry.org/pdf/OIA_OutdoorRecEconomyReport2012.pdf Target Sector & Cluster Analysis – Appendix D

523110	Investment Banking and Securities Dealing
523120	Securities Brokerage
523130	Commodity Contracts Dealing
523140	Commodity Contracts Brokerage
523210	Securities and Commodity Exchanges
523910	Miscellaneous Intermediation
523920	Portfolio Management
523930	Investment Advice
523991	Trust, Fiduciary, and Custody Activities
523999	Miscellaneous Financial Investment Activities
524113	Direct Life Insurance Carriers
524114	Direct Health and Medical Insurance Carriers
524126	Direct Property and Casualty Insurance Carriers
524127	Direct Title Insurance Carriers
524128	Other Direct Insurance (except Life, Health, and Medical) Carriers
524130	Reinsurance Carriers
524210	Insurance Agencies and Brokerages
524291	Claims Adjusting
524292	Third Party Administration of Insurance and Pension Funds
524298	All Other Insurance Related Activities
525110	Pension Funds
525120	Health and Welfare Funds
525190	Other Insurance Funds
525910	Open-End Investment Funds
525920	Trusts, Estates, and Agency Accounts
525990	Other Financial Vehicles
531110	Lessors of Residential Buildings and Dwellings
531120	Lessors of Nonresidential Buildings (except Mini-warehouses)
531130	Lessors of Mini-warehouses and Self-Storage Units
531190	Lessors of Other Real Estate Property
531210	Offices of Real Estate Agents and Brokers
531311	Residential Property Managers
531312	Nonresidential Property Managers
531320	Offices of Real Estate Appraisers
531390	Other Activities Related to Real Estate
532111	Passenger Car Rental
532112	Passenger Car Leasing
532112	Truck, Utility Trailer, and RV (Recreational Vehicle) Rental and Leasing
532210	Consumer Electronics and Appliances Rental
532220	Formal Wear and Costume Rental
532230	Video Tape and Disc Rental
532291	Home Health Equipment Rental
	Recreational Goods Rental
532292 532299	All Other Consumer Goods Rental
532310	General Rental Centers Commercial Air, Pail, and Water Transportation Equipment Pontal and Leasing
532411	Commercial Air, Rail, and Water Transportation Equipment Rental and Leasing
532412	Construction, Mining, and Forestry Machinery and Equipment Rental and Leasing
532420	Office Machinery and Equipment Rental and Leasing
532490	Other Commercial and Industrial Machinery and Equipment Rental and Leasing
533110	Lessors of Nonfinancial Intangible Assets (except Copyrighted Works)

551111	Offices of Bank Holding Companies
551112	Offices of Other Holding Companies
551114	Corporate, Subsidiary, and Regional Managing Offices

Summary and Conclusions

Assets

- Reputation as a competitive location for captive insurance industry.
- Ability to work with captive insurance industry to provide a business friendly climate that is able to change with the industry over time.
- Premium tax credit for new captive companies and other incentives for captives to locate in Vermont. Ongoing attraction and retention efforts geared towards developing the captive insurance industry in Vermont.
- There has been growth in the Corporate, Subsidiary, and Regional Managing Offices industry. This industry is comprised of establishments (except government establishments) primarily engaged in administering, overseeing, and managing other establishments of the company or enterprise. These establishments normally undertake the strategic or organizational planning and decision making role of the company or enterprise. Establishments in this industry may hold the securities of the company or enterprise. While there has been growth in this industry, the location quotient is .38, indicating that this industry is not concentrated in Vermont as compared to the national average.

Challenges

- No real competitive advantage in the cluster other than in captive insurance. The location
 quotient analysis did not identify any industries with extremely high concentrations of
 employment.
- Increasing use of online banking and decreased demand for in-person operations may lead to a decrease in employment.

Data Findings

In 2013, employment in the Business, Finance, and Insurance Cluster accounted for 4.52% of total employment in Vermont, or 16,138 total jobs.

In 2012, the latest year for which establishment data is available, there were 1,779 total establishments in the Business, Finance, and Insurance Cluster in Vermont representing 7.29% of all establishments in Vermont. The average establishment size in the Business, Finance, and Insurance Cluster was 9 employees per establishment compared to an average establishment size of 14.5 in Vermont for all industries.

The Location Quotient analysis identifies Savings Institutions (3.43), Credit Unions (1.67), All Other Consumer Goods Rental (1.69), Offices of Real Estate Appraisers (1.30), Video Tape and Disc Rental (1.52), Trust, Fiduciary, and Custody Activities (1.29), and Recreational Goods Rental (1.42) as having concentrations significantly higher than the national average.

Between 2008 and 2013 the Business, Finance, and Insurance Cluster gained 621 jobs (4% increase). There were some major losses in Commercial Banking (43% loss or 1,165 jobs) but the gain was driven by Corporate, Subsidiary, and Regional Managing Offices (gained 1,680 jobs) and Savings Institutions

(593 jobs added). Looking over the next 10 years, the Business, Finance, and Insurance Cluster is projected to continue with steady growth, adding another 693 jobs by 2023.

In 2013 occupations with the largest numbers of jobs in the Business, Finance, and Insurance Cluster include Tellers (1,304 jobs), Insurance Sales Agents (1,262 jobs), Real Estate Sales Agents (929 jobs), Securities, Commodities, and Finance Services Sales Agents (715 jobs), and Customer Service Representatives (688).

Between 2013 and 2023 occupation growth in the Business, Finance, and Insurance Cluster is projected to remain stable with some small gains to be made in Maintenance and Repairs Workers, General (65 jobs to be gained), Personal Financial Advisors (57 jobs to be gained), Accountants and Auditors (52 jobs to be gained), Securities, Commodities, and Finance Service Sales Agents (45 jobs to be gained), and Market Research Analysts and Marketing Specialists (43 jobs to be gained).

Average wages in the Business, Finance, and Insurance Cluster are higher than wages in all industries in Vermont which in 2013 were \$38,401 on average annually. Some of the top occupations in the cluster have lower wages such as Tellers, Real Estate Agents, Secretaries, and Maintenance and Repair Workers, but as a whole the cluster has a higher average salary.

Existing Conditions

	Business, Finance, and Insurance Clu	ster - Cur	rent Employ	ment and	Establish	nments	
NAICS	Description	2013 Jobs	% of Cluster	% of VT Jobs	# of Est.	Emp. Per Est.	LQ
551114	Corporate, Subsidiary, and Regional Managing Offices	1,774	10.99%	0.50%	95	19	0.38
524210	Insurance Agencies and Brokerages	1,687	10.45%	0.47%	215	8	0.76
522110	Commercial Banking	1,523	9.44%	0.43%	124	12	0.49
522120	Savings Institutions	1,460	9.05%	0.41%	110	13	3.43
522130	Credit Unions	935	5.79%	0.26%	70	13	1.67
524126	Direct Property and Casualty Insurance Carriers	825	5.11%	0.23%	72	11	0.71
531311	Residential Property Managers	819	5.07%	0.23%	135	6	0.86
531110	Lessors of Residential Buildings and Dwellings	806	4.99%	0.23%	67	12	0.74
524113	Direct Life Insurance Carriers	772	4.78%	0.22%	31	25	1.13
531210	Offices of Real Estate Agents and Brokers	771	4.78%	0.22%	188	4	0.76
524114	Direct Health and Medical Insurance Carriers	434	2.69%	0.12%	11	39	0.49
531120	Lessors of Nonresidential Buildings (except Mini-warehouses)	390	2.42%	0.11%	39	10	0.83
523930	Investment Advice	337	2.09%	0.09%	51	7	0.74
524292	Third Party Administration of Insurance and Pension Funds	314	1.95%	0.09%	18	17	0.82
523920	Portfolio Management	253	1.57%	0.07%	42	6	0.60
523120	Securities Brokerage	244	1.51%	0.07%	36	7	0.37
531390	Other Activities Related to Real Estate	240	1.49%	0.07%	17	14	0.78
522292	Real Estate Credit	218	1.35%	0.06%	14	16	0.41

532299	All Other Consumer Goods Rental	216	1.34%	0.06%	24	9	1.69
531312	Nonresidential Property Managers	206	1.28%	0.06%	36	6	0.57
523110	Investment Banking and Securities Dealing	202	1.25%	0.06%	27	7	0.57
531130	Lessors of Mini-warehouses and Self-Storage Units	161	1.00%	0.05%	19	8	0.82
532120	Truck, Utility Trailer, and RV (Recreational Vehicle) Rental and Leasing	147	0.91%	0.04%	8	18	1.03
531320	Offices of Real Estate Appraisers	134	0.83%	0.04%	59	2	1.30
532111	Passenger Car Rental	122	0.76%	0.03%	16	8	0.47
531190	Lessors of Other Real Estate Property	110	0.68%	0.03%	15	7	0.81
532230	Video Tape and Disc Rental	93	0.58%	0.03%	23	4	1.52
532291	Home Health Equipment Rental	92	0.57%	0.03%	10	9	0.99
532310	General Rental Centers	78	0.48%	0.02%	13	6	0.81
524298	All Other Insurance Related Activities	73	0.45%	0.02%	18	4	0.41
522310	Mortgage and Nonmortgage Loan Brokers	71	0.44%	0.02%	24	3	0.40
523991	Trust, Fiduciary, and Custody Activities	69	0.43%	0.02%	12	6	1.29
522298	All Other Nondepository Credit Intermediation	62	0.38%	0.02%	9	7	0.38
524291	Claims Adjusting	49	0.30%	0.01%	18	3	0.28
532210	Consumer Electronics and Appliances Rental	41	0.25%	0.01%	4	10	0.63
532292	Recreational Goods Rental	39	0.24%	0.01%	13	3	1.42
523910	Miscellaneous Intermediation	35	0.22%	0.01%	2	18	0.41
551112	Offices of Other Holding Companies	30	0.19%	0.01%	10	3	0.18
532490	Other Commercial and Industrial Machinery and Equipment Rental and Leasing	28	0.17%	0.01%	8	4	0.21
525110	Pension Funds	26	0.16%	0.01%	5	5	0.67
523999	Miscellaneous Financial Investment Activities	24	0.15%	0.01%	3	8	0.40
524130	Reinsurance Carriers	21	0.13%	0.01%	6	4	0.32
522220	Sales Financing	19	0.12%	0.01%	4	5	0.09
522294	Secondary Market Financing	19	0.12%	0.01%	2	10	0.43
524127	Direct Title Insurance Carriers	18	0.11%	0.01%	7	3	0.13
522320	Financial Transactions Processing, Reserve, and Clearinghouse Activities	17	0.11%	0.00%	11	2	0.06
525120	Health and Welfare Funds	17	0.11%	0.00%	2	9	0.65
522390	Other Activities Related to Credit Intermediation	15	0.09%	0.00%	6	3	0.07
532412	Construction, Mining, and Forestry Machinery and Equipment Rental and Leasing	14	0.09%	0.00%	3	5	0.09
	Target Sector & Cl	uctor Anal	vcic - Anno	ndiv D			

Target Sector & Cluster Analysis – Appendix D

532112	Passenger Car Leasing	13	0.08%	0.00%	2	7	0.62
532420	Office Machinery and Equipment Rental and Leasing	12	0.07%	0.00%	2	6	0.64
533110	Lessors of Nonfinancial Intangible Assets (except Copyrighted Works)	12	0.07%	0.00%	8	2	0.22
525990	Other Financial Vehicles	11	0.07%	0.00%	1	11	0.51
Busines Total	s, Finance, and Insurance Cluster	16,138	100.00%	4.52%	1,779	9	

Source: QCEW Employees, Non-QCEW Employees & Self-Employed - EMSI 2013.4 Class of Worker

Note: Industries with fewer than 10 employees not included

Industry Data *Historic 2008-2013*

Business, Finance, and Insurance Cluster - Historic Growth							
NAICS	Description	2008 Jobs	2013 Jobs	# Change	% Change		
551114	Corporate, Subsidiary, and Regional Managing Offices	94	1,774	1,680	1787%		
522120	Savings Institutions	867	1,460	593	68%		
531311	Residential Property Managers	658	819	161	24%		
522130	Credit Unions	786	935	149	19%		
524114	Direct Health and Medical Insurance Carriers	290	434	144	50%		
522292	Real Estate Credit	116	218	102	88%		
524292	Third Party Administration of Insurance and Pension Funds	212	314	102	48%		
523120	Securities Brokerage	150	244	94	63%		
531110	Lessors of Residential Buildings and Dwellings	746	806	60	8%		
523991	Trust, Fiduciary, and Custody Activities	25	69	44	176%		
532120	Truck, Utility Trailer, and RV (Recreational Vehicle) Rental and Leasing	108	147	39	36%		
532299	All Other Consumer Goods Rental	185	216	31	17%		
532291	Home Health Equipment Rental	73	92	19	26%		
522294	Secondary Market Financing	<10	19	14	280%		
525120	Health and Welfare Funds	<10	17	12	240%		
532292	Recreational Goods Rental	29	39	10	34%		
532490	Other Commercial and Industrial Machinery and Equipment Rental and Leasing	20	28	8	40%		
522220	Sales Financing	12	19	7	58%		
522298	All Other Nondepository Credit Intermediation	55	62	7	13%		
525990	Other Financial Vehicles	<10	11	6	120%		
531120	Lessors of Nonresidential Buildings (except Mini-warehouses)	385	390	5	1%		
525110	Pension Funds	22	26	4	18%		
522310	Mortgage and Nonmortgage Loan Brokers	69	71	2	3%		
532210	Consumer Electronics and Appliances Rental	41	41	0	0%		

Target Sector & Cluster Analysis – Appendix D

524130 Reinsurance Carriers	23	21	(2)	-9%
532420 Office Machinery and Equipment Rental and Leasing	14	12	(2)	-14%
533110 Lessors of Nonfinancial Intangible Assets (except Copyrighted Works)	14	12	(2)	-14%
522320 Financial Transactions Processing, Reserve, and Clearinghouse Activities	21	17	(4)	-19%
522390 Other Activities Related to Credit Intermediation	19	15	(4)	-21%
524298 All Other Insurance Related Activities	77	73	(4)	-5%
531190 Lessors of Other Real Estate Property	114	110	(4)	-4%
532112 Passenger Car Leasing	19	13	(6)	-32%
532412 Construction, Mining, and Forestry Machinery and Equipment Rental and Leasing	20	14	(6)	-30%
524127 Direct Title Insurance Carriers	26	18	(8)	-31%
532310 General Rental Centers	86	78	(8)	-9%
523910 Miscellaneous Intermediation	44	35	(9)	-20%
523920 Portfolio Management	267	253	(14)	-5%
522291 Consumer Lending	22	<10	(17)	-77%
523930 Investment Advice	354	337	(17)	-5%
531130 Lessors of Mini-warehouses and Self-Storage Units	180	161	(19)	-11%
523999 Miscellaneous Financial Investment Activities	45	24	(21)	-47%
531312 Nonresidential Property Managers	233	206	(27)	-12%
524210 Insurance Agencies and Brokerages	1,716	1,687	(29)	-2%
525190 Other Insurance Funds	36	<10	(31)	-86%
524291 Claims Adjusting	87	49	(38)	-44%
531320 Offices of Real Estate Appraisers	172	134	(38)	-22%
532111 Passenger Car Rental	168	122	(46)	-27%
524126 Direct Property and Casualty Insurance Carriers	877	825	(52)	-6%
531390 Other Activities Related to Real Estate	350	240	(110)	-31%
523110 Investment Banking and Securities Dealing	323	202	(121)	-37%
551112 Offices of Other Holding Companies	180	30	(150)	-83%
531210 Offices of Real Estate Agents and Brokers	979	771	(208)	-21%
524113 Direct Life Insurance Carriers	991	772	(219)	-22%
532230 Video Tape and Disc Rental	380	93	(287)	-76%
522110 Commercial Banking	2,688	1,523	(1,165)	-43%
Business, Finance, and Insurance Cluster Total	15,517	16,138	621	4%

Source: QCEW Employees, Non-QCEW Employees & Self-Employed - EMSI 2013.4 Class of Worker Note: Industries with fewer than 10 employees in 2008 and 2013 not included. For industries with fewer than 10 employees in only one year, analyst assumes 5 employees for purposes of calculation.

Projected 2013-2023

Business, Finance, and Insurance Cluster - Projected Growth							
NAICS	Description	2013 Jobs	2023 Jobs	# Change	% Change		

551114 Oroporate, Subsidiary, and Regional Managing 1,774 2,375 601 34% 522120 Savings Institutions 1,460 1,949 489 33% 522130 Credit Unions 935 1,175 240 26% 531110 Lessors of Residential Buildings and Dwellings 806 984 178 22% 531311 Residential Property Managers 819 987 168 21% 532120 Securities Brokerage 244 368 124 51% 532293 All Other Consumer Goods Rental 216 323 107 50% 524292 Real Estate Credit 18 285 67 31% 522292 Real Estate Credit 218 285 67 31% 532120 Truck, Utility Trailer, and RV (Recreational Vehicle) Rental and Leasing 147 198 51 35% 522120 Portfolio Management 253 302 49 19% 522120 Portfolio Management 253 302		0				
522130 Credit Unions 935 1,175 240 26% 531110 Lessors of Residential Buildings and Dwellings 806 994 178 22% 531311 Residential Property Managers 819 987 168 21% 532120 Securities Brokerage 244 388 124 51% 532299 All Other Consumer Goods Rental 216 323 107 50% 524292 Third Party Administration of Insurance and Pension Funds 314 419 105 33% 522292 Real Estate Oredit 218 285 67 31% 523930 Investment Advice 337 396 59 18% 532120 Portfolio Management 253 302 49 19% 523210 Portfolio Management 253 302 49 19% 523290 Portfolio Management 253 302 49 19% 524114 Direct Health Equipment Rental 92 119 27 29% <td>551114</td> <td>Corporate, Subsidiary, and Regional Managing Offices</td> <td>1,774</td> <td>2,375</td> <td>601</td> <td>34%</td>	551114	Corporate, Subsidiary, and Regional Managing Offices	1,774	2,375	601	34%
531110 Lessors of Residential Buildings and Dwellings 806 984 178 22% 531311 Residential Property Managers 819 987 168 21% 53120 Securities Brokerage 244 368 124 51% 532299 All Other Consumer Goods Rental 216 323 107 50% 524292 Third Party Administration of Insurance and Pension Funds 314 419 105 33% 522292 Real Estate Credit 218 285 67 31% 523290 Investment Advice 337 396 59 18% 532120 Truck, Utility Trailer, and RV (Recreational Vehicle) Rental and Leasing 147 198 51 35% 523200 Portfolio Management 253 302 49 19% 523210 Truck, Utility Trailer, and RV (Recreational Vehicle and Vehicle and Advisor) 2119 27 29% 523200 Portfolio Management 253 302 49 19% 522221 Home Health Equipment Re	522120	Savings Institutions	1,460	1,949	489	33%
5313111 Residential Property Managers 819 987 168 21% 523120 Securities Brokerage 244 368 124 51% 532299 All Other Consumer Goods Rental 216 323 107 50% 524292 Park Administration of Insurance and Pension Funds 314 419 105 33% 522920 Real Estate Credit 218 285 67 31% 523930 Investment Advice 337 396 59 18% 532120 Truck, Utility Trailer, and RV (Recreational Vehicle) Rental and Leasing 147 198 51 35% 523920 Portfolio Management 253 302 49 19% 524 466 31 7% 523120 Portfolio Management 253 302 49 19 27 29% 523120 Home Health Equipment Rental 92 119 27 29% 522210 Becondary Market Financing 19 44 25 132% 525120 <	522130	Credit Unions	935	1,175	240	26%
523120 Securities Brokerage 244 368 124 51% 532299 All Other Consumer Goods Rental 216 323 107 50% 524292 Third Partly Administration of Insurance and Pension Funds 314 419 105 33% 522292 Real Estate Credit 218 285 67 31% 523930 Investment Advice 337 396 59 18% 532120 Truck, Utility Trailer, and RV (Recreational Vehicle) Rental and Leasing 147 198 51 35% 523920 Portfolio Management 253 302 49 19% 524114 Direct Health and Medical Insurance Carriers 434 465 31 7% 522291 Home Health Equipment Rental 92 119 27 29% 522294 Secondary Market Financing 19 44 25 132% 522220 Sales Financing 19 40 21 111% 52510 Health and Welfare Funds 17 30 <td>531110</td> <td>Lessors of Residential Buildings and Dwellings</td> <td>806</td> <td>984</td> <td>178</td> <td>22%</td>	531110	Lessors of Residential Buildings and Dwellings	806	984	178	22%
532299 All Other Consumer Goods Rental 216 323 107 50% 524292 Third Party Administration of Insurance and Pension Funds 314 419 105 33% 522292 Real Estate Credit 218 285 67 31% 523930 Investment Advice 337 396 59 18% 532120 Truck, Utility Trailer, and RV (Recreational Vehicle) Rental and Leasing 147 198 51 35% 523920 Portfolio Management 253 302 49 19% 523920 Portfolio Management 253 302 49 19% 524114 Direct Health and Medical Insurance Carriers 434 465 31 7% 522294 Home Health Equipment Rental 92 119 27 29% 522220 Sales Financing 19 44 25 132% 525120 Health and Welfare Funds 17 30 13 76% 525290 Other Commercial and Industrial Machinery and Equipment Rental and Leasi	531311	Residential Property Managers	819	987	168	21%
524292 Third Party Administration of Insurance and Pension Funds 314 419 105 33% 522292 Real Estate Credit 218 285 67 31% 5223930 Investment Advice 337 396 59 18% 532120 Truck, Utility Trailer, and RV (Recreational Vehicle) Rental and Leasing 147 198 51 35% 523920 Portfolio Management 253 302 49 19% 524114 Direct Health and Medical Insurance Carriers 434 465 31 7% 532291 Home Health Equipment Rental 92 119 27 29% 522294 Secondary Market Financing 19 44 25 132% 522210 Bales Financing 19 40 21 111% 522220 Sales Financial Vehicles 17 30 13 76% 525120 Other Commercial and Industrial Machinery and Equipment Rental and Leasing 26 31 5 19% 523240 Financial Transactions Proc	523120	Securities Brokerage	244	368	124	51%
524292 Pension Funds 314 419 105 33% 522292 Real Estate Credit 218 285 67 31% 523930 Investment Advice 337 396 59 18% 532120 Truck, Utility Trailer, and RV (Recreational Vehicle) Rental and Leasing 147 198 51 35% 523920 Portfolio Management 253 302 49 19% 524114 Direct Health and Medical Insurance Carriers 434 465 31 7% 532291 Home Health Equipment Rental 92 119 27 29% 522294 Secondary Market Financing 19 40 21 111% 522220 Sales Financing 19 40 21 111% 525120 Health and Welfare Funds 17 30 13 76% 525290 Other Commercial and Industrial Machinery and Equipment Rental and Leasing 28 37 9 32% 525110 Pension Funds 26 31 5	532299	All Other Consumer Goods Rental	216	323	107	50%
523930 Investment Advice 337 396 59 18% 532120 Truck, Utility Trailer, and RV (Recreational Vehicle) Rental and Leasing 147 198 51 35% 523920 Portfolio Management 253 302 49 19% 524114 Direct Health and Medical Insurance Carriers 434 465 31 7% 532291 Home Health Equipment Rental 92 119 27 29% 522294 Secondary Market Financing 19 44 25 132% 522290 Seles Financing 19 40 21 111% 525120 Health and Welfare Funds 17 30 13 76% 525120 Health and Welfare Funds 11 20 9 82% 525120 Other Commercial and Industrial Machinery and Equipment Rental and Leasing 28 37 9 32% 525110 Pension Funds 26 31 5 19% 522320 Financial Transactions Processing, Reserve, and Clearinghouse Activities<	524292		314	419	105	33%
532120 Truck, Utility Trailer, and RV (Recreational Vehicle) Rental and Leasing 147 198 51 35% 523920 Portfolio Management 253 302 49 19% 524114 Direct Health and Medical Insurance Carriers 434 465 31 7% 532291 Home Health Equipment Rental 92 119 27 29% 522294 Secondary Market Financing 19 44 25 132% 522220 Sales Financing 19 40 21 111% 525120 Health and Welfare Funds 17 30 13 76% 525990 Other Financial Vehicles 11 20 9 82% 532490 Cher Commercial and Industrial Machinery and Equipment Rental and Leasing 28 37 9 32% 525110 Pension Funds 26 31 5 19% 522320 Financial Transactions Processing, Reserve, and Clearinghouse Activities 17 21 4 24% 524130 Reinsurance Carriers </td <td>522292</td> <td>Real Estate Credit</td> <td>218</td> <td>285</td> <td>67</td> <td>31%</td>	522292	Real Estate Credit	218	285	67	31%
532120 Vehicle) Rental and Leasing 147 190 51 33% 523920 Portfolio Management 253 302 49 19% 524114 Direct Health and Medical Insurance Carriers 434 465 31 7% 522214 Home Health Equipment Rental 92 119 27 29% 522294 Secondary Market Financing 19 44 25 132% 522202 Sales Financing 19 40 21 111% 525120 Health and Welfare Funds 17 30 13 76% 525990 Other Financial Vehicles 11 20 9 82% 532490 Cher Commercial and Industrial Machinery and Equipment Rental and Leasing 28 37 9 32% 525110 Pension Funds 26 31 5 19% 522320 Financial Transactions Processing, Reserve, and Clearinghouse Activities 17 21 4 24% 524130 Reinsurance Carriers 21 25	523930	Investment Advice	337	396	59	18%
524114 Direct Health and Medical Insurance Carriers 434 465 31 7% 532291 Home Health Equipment Rental 92 119 27 29% 522294 Secondary Market Financing 19 44 25 132% 522200 Sales Financing 19 40 21 111% 525120 Health and Welfare Funds 17 30 13 76% 525990 Other Financial Vehicles 11 20 9 82% 532490 Other Commercial and Industrial Machinery and Equipment Rental and Leasing 28 37 9 32% 525110 Pension Funds 26 31 5 19% 522320 Financial Transactions Processing, Reserve, and Clearinghouse Activities 17 21 4 24% 524130 Reinsurance Carriers 21 25 4 19% 532420 Office Machinery and Equipment Rental and Leasing 12 16 4 33% 531130 Investment Banking and Securities Dealing	532120		147	198	51	35%
532291 Home Health Equipment Rental 92 119 27 29% 522294 Secondary Market Financing 19 44 25 132% 522220 Sales Financing 19 40 21 111% 525120 Health and Welfare Funds 17 30 13 76% 525990 Other Financial Vehicles 11 20 9 82% 532490 Editor Commercial and Industrial Machinery and Equipment Rental and Leasing 28 37 9 32% 525110 Pension Funds 26 31 5 19% 522320 Financial Transactions Processing, Reserve, and Clearinghouse Activities 17 21 4 24% 524130 Reinsurance Carriers 21 25 4 19% 532420 Office Machinery and Equipment Rental and Leasing 12 16 4 33% 531130 Lessors of Mini-warehouses and Self-Storage Units 161 163 2 1% 523110 Investment Banking and Securities Dealing <td>523920</td> <td>Portfolio Management</td> <td>253</td> <td>302</td> <td>49</td> <td>19%</td>	523920	Portfolio Management	253	302	49	19%
522294 Secondary Market Financing 19 44 25 132% 522220 Sales Financing 19 40 21 111% 525120 Health and Welfare Funds 17 30 13 76% 525990 Other Financial Vehicles 11 20 9 82% 532490 Other Commercial and Industrial Machinery and Equipment Rental and Leasing 26 31 5 19% 525110 Pension Funds 26 31 5 19% 522320 Financial Transactions Processing, Reserve, and Clearinghouse Activities 17 21 4 24% 524130 Reinsurance Carriers 21 25 4 19% 532420 Office Machinery and Equipment Rental and Leasing 12 16 4 33% 531130 Lessors of Mini-warehouses and Self-Storage Units 161 163 2 1% 523110 Investment Banking and Securities Dealing 202 201 (1) 0% 532112 Passenger Car Leasing	524114	Direct Health and Medical Insurance Carriers	434	465	31	7%
522220 Sales Financing 19 40 21 111% 525120 Health and Welfare Funds 17 30 13 76% 525990 Other Financial Vehicles 11 20 9 82% 532490 Other Commercial and Industrial Machinery and Equipment Rental and Leasing 28 37 9 32% 525110 Pension Funds 26 31 5 19% 522320 Financial Transactions Processing, Reserve, and Clearinghouse Activities 17 21 4 24% 524130 Reinsurance Carriers 21 25 4 19% 532420 Office Machinery and Equipment Rental and Leasing 12 16 4 33% 531130 Lessors of Mini-warehouses and Self-Storage Units 161 163 2 1% 523110 Investment Banking and Securities Dealing 202 201 (1) 0% 532112 Passenger Car Leasing 13 11 (2) -15% 532121 Passenger Car Leasing <	532291	Home Health Equipment Rental	92	119	27	29%
525120 Health and Welfare Funds 17 30 13 76% 525990 Other Financial Vehicles 11 20 9 82% 532490 Other Commercial and Industrial Machinery and Equipment Rental and Leasing 28 37 9 32% 525110 Pension Funds 26 31 5 19% 522320 Financial Transactions Processing, Reserve, and Clearinghouse Activities 17 21 4 24% 524130 Reinsurance Carriers 21 25 4 19% 532420 Office Machinery and Equipment Rental and Leasing 12 16 4 33% 531130 Lessors of Mini-warehouses and Self-Storage Units 161 163 2 1% 523110 Investment Banking and Securities Dealing 202 201 (1) 0% 532112 Passenger Car Leasing 13 11 (2) -15% 532112 Passenger Car Leasing 13 11 (2) -15% 532292 Recreational Goods Rental <td>522294</td> <td>Secondary Market Financing</td> <td>19</td> <td>44</td> <td>25</td> <td>132%</td>	522294	Secondary Market Financing	19	44	25	132%
525990 Other Financial Vehicles 11 20 9 82% 532490 Other Commercial and Industrial Machinery and Equipment Rental and Leasing 28 37 9 32% 525110 Pension Funds 26 31 5 19% 522320 Financial Transactions Processing, Reserve, and Clearinghouse Activities 17 21 4 24% 524130 Reinsurance Carriers 21 25 4 19% 532420 Office Machinery and Equipment Rental and Leasing 12 16 4 33% 531130 Lessors of Mini-warehouses and Self-Storage Units 161 163 2 1% 523110 Investment Banking and Securities Dealing 202 201 (1) 0% 523910 Miscellaneous Intermediation 35 34 (1) -3% 532112 Passenger Car Leasing 13 11 (2) -15% 532292 Recreational Goods Rental 39 36 (3) -8% 5321120 Lessors of Nonfinanc	522220	Sales Financing	19	40	21	111%
532490 Other Commercial and Industrial Machinery and Equipment Rental and Leasing 28 37 9 32% 525110 Pension Funds 26 31 5 19% 522320 Financial Transactions Processing, Reserve, and Clearinghouse Activities 17 21 4 24% 524130 Reinsurance Carriers 21 25 4 19% 532420 Office Machinery and Equipment Rental and Leasing 12 16 4 33% 531130 Lessors of Mini-warehouses and Self-Storage Units 161 163 2 1% 523110 Investment Banking and Securities Dealing 202 201 (1) 0% 523112 Passenger Car Leasing 13 11 (2) -15% 532292 Recreational Goods Rental 39 36 (3) -8% 531120 Lessors of Nonresidential Buildings (except Mini-warehouses) 390 385 (5) -1% 532210 Consumer Electronics and Appliances Rental 41 35 (6) -15%	525120	Health and Welfare Funds	17	30	13	76%
Equipment Rental and Leasing 525110 Pension Funds 526 31 5 19% 522320 Financial Transactions Processing, Reserve, and Clearinghouse Activities 524130 Reinsurance Carriers 21 25 4 19% 532420 Office Machinery and Equipment Rental and Leasing 532420 Lessors of Mini-warehouses and Self-Storage Units 531130 Units 523110 Investment Banking and Securities Dealing 523110 Investment Banking and Securities Dealing 523111 Passenger Car Leasing 532112 Passenger Car Leasing 532292 Recreational Goods Rental 532292 Recreational Goods Rental 532210 Consumer Electronics and Appliances Rental 41 35 (6) -15% 533110 Lessors of Nonfinancial Intangible Assets (except Copyrighted Works) 524127 Direct Title Insurance Carriers 532412 Construction, Mining, and Forestry Machinery and Equipment Rental and Leasing 528 37 9 32% 52429 Claims Adjusting	525990	Other Financial Vehicles	11	20	9	82%
522320 Financial Transactions Processing, Reserve, and Clearinghouse Activities 17 21 4 24% 524130 Reinsurance Carriers 21 25 4 19% 532420 Office Machinery and Equipment Rental and Leasing 12 16 4 33% 531130 Lessors of Mini-warehouses and Self-Storage Units 161 163 2 1% 523110 Investment Banking and Securities Dealing 202 201 (1) 0% 523910 Miscellaneous Intermediation 35 34 (1) -3% 532112 Passenger Car Leasing 13 11 (2) -15% 532292 Recreational Goods Rental 39 36 (3) -8% 531120 Lessors of Nonresidential Buildings (except Mini-warehouses) 390 385 (5) -1% 532210 Consumer Electronics and Appliances Rental 41 35 (6) -15% 533110 Lessors of Nonfinancial Intangible Assets (except Copyrighted Works) 12 <10	532490	·	28	37	9	32%
522320 and Clearinghouse Activities 17 21 4 24% 524130 Reinsurance Carriers 21 25 4 19% 532420 Office Machinery and Equipment Rental and Leasing 12 16 4 33% 532420 Lessors of Mini-warehouses and Self-Storage Units 161 163 2 1% 531130 Lessors of Mini-warehouses and Self-Storage Units 202 201 (1) 0% 523110 Investment Banking and Securities Dealing 202 201 (1) 0% 523910 Miscellaneous Intermediation 35 34 (1) -3% 532112 Passenger Car Leasing 13 11 (2) -15% 532292 Recreational Goods Rental 39 36 (3) -8% 531120 Lessors of Nonresidential Buildings (except Mini-warehouses) 390 385 (5) -1% 532210 Consumer Electronics and Appliances Rental 41 35 (6) -15% 533110 Lessors of Nonfinancial Intangible Assets (except Copyrighted Works) 12 <10	525110	Pension Funds	26	31	5	19%
532420 Office Machinery and Equipment Rental and Leasing 12 16 4 33% 531130 Lessors of Mini-warehouses and Self-Storage Units 161 163 2 1% 523110 Investment Banking and Securities Dealing 202 201 (1) 0% 523110 Miscellaneous Intermediation 35 34 (1) -3% 532112 Passenger Car Leasing 13 11 (2) -15% 532292 Recreational Goods Rental 39 36 (3) -8% 531120 Lessors of Nonresidential Buildings (except Mini-warehouses) 390 385 (5) -1% 532210 Consumer Electronics and Appliances Rental 41 35 (6) -15% 533110 Lessors of Nonfinancial Intangible Assets (except Copyrighted Works) 12 <10	522320		17	21	4	24%
532420 Leasing 12 16 4 33% 531130 Lessors of Mini-warehouses and Self-Storage Units 161 163 2 1% 523110 Investment Banking and Securities Dealing 202 201 (1) 0% 523910 Miscellaneous Intermediation 35 34 (1) -3% 532112 Passenger Car Leasing 13 11 (2) -15% 532292 Recreational Goods Rental 39 36 (3) -8% 531120 Lessors of Nonresidential Buildings (except Mini-warehouses) 390 385 (5) -1% 532210 Consumer Electronics and Appliances Rental 41 35 (6) -15% 533110 Lessors of Nonfinancial Intangible Assets (except Copyrighted Works) 12 <10	524130	Reinsurance Carriers	21	25	4	19%
531130 Units 161 163 2 1% 523110 Investment Banking and Securities Dealing 202 201 (1) 0% 523910 Miscellaneous Intermediation 35 34 (1) -3% 532112 Passenger Car Leasing 13 11 (2) -15% 532292 Recreational Goods Rental 39 36 (3) -8% 531120 Lessors of Nonresidential Buildings (except Mini-warehouses) 390 385 (5) -1% 532210 Consumer Electronics and Appliances Rental 41 35 (6) -15% 533110 Lessors of Nonfinancial Intangible Assets (except Copyrighted Works) 12 <10	532420	· · ·	12	16	4	33%
523910 Miscellaneous Intermediation 35 34 (1) -3% 532112 Passenger Car Leasing 13 11 (2) -15% 532292 Recreational Goods Rental 39 36 (3) -8% 531120 Lessors of Nonresidential Buildings (except Mini-warehouses) 390 385 (5) -1% 532210 Consumer Electronics and Appliances Rental 41 35 (6) -15% 533110 Lessors of Nonfinancial Intangible Assets (except Copyrighted Works) 12 <10	531130		161	163	2	1%
532112 Passenger Car Leasing 13 11 (2) -15% 532292 Recreational Goods Rental 39 36 (3) -8% 531120 Lessors of Nonresidential Buildings (except Mini-warehouses) 390 385 (5) -1% 532210 Consumer Electronics and Appliances Rental 41 35 (6) -15% 533110 Lessors of Nonfinancial Intangible Assets (except Copyrighted Works) 12 <10	523110	Investment Banking and Securities Dealing	202	201	(1)	0%
Figure 1.5 Recreational Goods Rental 39 36 (3) -8% Elessors of Nonresidential Buildings (except Mini-warehouses) 390 385 (5) -1% Elessors of Nonfinancial Buildings (except Mini-warehouses) 390 385 (5) -1% Elessors of Nonfinancial Intangible Assets (except Copyrighted Works) 12 <10 (7) -58% Elessors of Nonfinancial Intangible Assets (except Copyrighted Works) 12 <10 (7) -58% Elessors of Nonfinancial Intangible Assets (except Copyrighted Works) 12 <10 (7) -58% Elessors of Nonfinancial Intangible Assets (except Copyrighted Works) 12 <10 (7) -58% Elessors of Nonfinancial Intangible Assets (except Copyrighted Works) 12 <10 (7) -58% Elessors of Nonfinancial Intangible Assets (except Copyrighted Works) 12 <10 (7) -58% Elessors of Nonfinancial Intangible Assets (except Copyrighted Works) 12 <10 (7) -58% Elessors of Nonfinancial Intangible Assets (except Copyrighted Works) 12 <10 (7) -58% Elessors of Nonfinancial Intangible Assets (except Copyrighted Works) 12 <10 (7) -58% Elessors of Nonfinancial Intangible Assets (except Copyrighted Works) 12 <10 (7) -58% Elessors of Nonfinancial Intangible Assets (except Copyrighted Works) 12 <10 (7) -58% Elessors of Nonfinancial Intangible Assets (except Copyrighted Works) 12 <10 (7) -58% Elessors of Nonfinancial Intangible Assets (except Copyrighted Works) 12 <10 (7) -58% Elessors of Nonfinancial Intangible Assets (except Copyrighted Works) 12 <10 (7) -58% Elessors of Nonfinancial Intangible Assets (except Copyrighted Works) 12 <10 (7) -58% Elessors of Nonfinancial Intangible Assets (except Copyrighted Works) 12 <10 (7) -58% Elessors of Nonfinancial Intangible Assets (except Copyrighted Works) 12 <10 (7) -58% Elessors of Nonfinancial Intangible Assets (except Copyrighted Works) 12 <10 (7) -58% Elessors of Nonfinancial Intangible Assets (except Copyrighted Works) 12 <10 (7) -58% Elessors of Nonfinancial Intangible Assets (except Copyrighted Works) 12 <10 (7) -58% Elessors of Nonfinancial Intangible Assets (except Copyrighted Works) 12 <10 (7) -58% Elessors of	523910	Miscellaneous Intermediation	35	34	(1)	-3%
Lessors of Nonresidential Buildings (except Mini-warehouses) 532210 Consumer Electronics and Appliances Rental 41 35 (6) -15% Lessors of Nonfinancial Intangible Assets (except Copyrighted Works) 12 <10 (7) -58% 524127 Direct Title Insurance Carriers 18 11 (7) -39% Construction, Mining, and Forestry Machinery and Equipment Rental and Leasing 522390 Other Activities Related to Credit Intermediation 15 <10 (10) -67% 524291 Claims Adjusting 49 37 (12) -24%	532112	Passenger Car Leasing	13	11	(2)	-15%
Mini-warehouses) 532210 Consumer Electronics and Appliances Rental Lessors of Nonfinancial Intangible Assets (except Copyrighted Works) 12 <10 (7) -58% 532412 Construction, Mining, and Forestry Machinery and Equipment Rental and Leasing 522390 Other Activities Related to Credit Intermediation 5345 (6) -15% 12 <10 (7) -58% 13 11 (7) -39% 14 <10 (9) -64% 1524291 Claims Adjusting 49 37 (12) -24%	532292	Recreational Goods Rental	39	36	(3)	-8%
Lessors of Nonfinancial Intangible Assets (except Copyrighted Works) 524127 Direct Title Insurance Carriers 18 11 (7) -39% 532412 Construction, Mining, and Forestry Machinery and Equipment Rental and Leasing 522390 Other Activities Related to Credit Intermediation 524291 Claims Adjusting 12 <10 (7) -58% (7) -58% (7) -58% (8) -64% (9) -64% (10) -67% (10) -67%	531120		390	385	(5)	-1%
(except Copyrighted Works) 524127 Direct Title Insurance Carriers 18 11 (7) -39% 532412 Construction, Mining, and Forestry Machinery and Equipment Rental and Leasing 522390 Other Activities Related to Credit Intermediation 524291 Claims Adjusting 12 <10 (7) -58% (7) -58% (12) -64% (9) -64% (10) -67%	532210	Consumer Electronics and Appliances Rental	41	35	(6)	-15%
Construction, Mining, and Forestry Machinery and Equipment Rental and Leasing 522390 Other Activities Related to Credit Intermediation 524291 Claims Adjusting 14 <10 (9) -64% 15 <10 (10) -67% 17 <10 (10) -67%	533110	<u> </u>	12	<10	(7)	-58%
and Equipment Rental and Leasing 522390 Other Activities Related to Credit Intermediation 524291 Claims Adjusting 14 < 10 (9) -64% (10) -67% 49 37 (12) -24%	524127	Direct Title Insurance Carriers	18	11	(7)	-39%
524291 Claims Adjusting 49 37 (12) -24%	532412		14	<10	(9)	-64%
, 0	522390	Other Activities Related to Credit Intermediation	15	<10	(10)	-67%
524298 All Other Insurance Related Activities 73 60 (13) -18%	524291	Claims Adjusting	49	37	(12)	-24%
	524298	All Other Insurance Related Activities	73	60	(13)	-18%

Target Sector & Cluster Analysis – Appendix D

531190	Lessors of Other Real Estate Property	110	93	(17)	-15%
523999	Miscellaneous Financial Investment Activities	24	<10	(19)	-79%
523991	Trust, Fiduciary, and Custody Activities	69	47	(22)	-32%
532310	General Rental Centers	78	56	(22)	-28%
551112	Offices of Other Holding Companies	30	<10	(25)	-83%
531320	Offices of Real Estate Appraisers	134	108	(26)	-19%
524126	Direct Property and Casualty Insurance Carriers	825	797	(28)	-3%
531312	Nonresidential Property Managers	206	166	(40)	-19%
532111	Passenger Car Rental	122	80	(42)	-34%
531210	Offices of Real Estate Agents and Brokers	771	725	(46)	-6%
522298	All Other Nondepository Credit Intermediation	62	<10	(57)	-92%
524113	Direct Life Insurance Carriers	772	711	(61)	-8%
522310	Mortgage and Nonmortgage Loan Brokers	71	<10	(66)	-93%
531390	Other Activities Related to Real Estate	240	168	(72)	-30%
532230	Video Tape and Disc Rental	93	0	(93)	-100%
524210	Insurance Agencies and Brokerages	1,687	1,574	(113)	-7%
522110	Commercial Banking	1,523	658	(865)	-57%
Business	s, Finance, and Insurance Cluster Total	16,138	16,831	693	4%

Source: QCEW Employees, Non-QCEW Employees & Self-Employed - EMSI 2013.4 Class of Worker Note: Industries with fewer than 10 employees in 2013 and 2023 not included. For industries with fewer than 10 employees in only one year, analyst assumes 5 employees for purposes of calculation.

Occupation Data

	Business, Finance, and Insurance Cluster - Occupation Analysis (20 largest)						
SOC	Occupation	2013 Jobs	Annual Wages	Education Required			
43-3071	Tellers	1,304	\$26,120	Short-term on-the-job training			
41-3021	Insurance Sales Agents	1,262	\$53,820	Moderate-term on-the-job training			
41-9022	Real Estate Sales Agents	929	\$26,860	Postsecondary non-degree award			
41-3031	Securities, Commodities, and Financial Services Sales Agents	715	\$60,380	Bachelor's degree			
43-4051	Customer Service Representatives	688	\$28,980	Short-term on-the-job training			
43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	595	\$29,900	Short-term on-the-job training			
43-3031	Bookkeeping, Accounting, and Auditing Clerks	575	\$33,200	Moderate-term on-the-job training			
11-9141	Property, Real Estate, and Community Association Managers	502	\$44,900	Work experience in a related occupation			
49-9071	Maintenance and Repair Workers, General	423	\$33,840	Moderate-term on-the-job training			
43-1011	First-Line Supervisors of Office and Administrative Support Workers	389	\$47,260	Work experience in a related occupation			
13-2072	Loan Officers	378	\$57,400	Moderate-term on-the-job training			

Target Sector & Cluster Analysis – Appendix D

13-2011	Accountants and Auditors	368	\$57,160	Bachelor's degree
43-9041	Insurance Claims and Policy Processing Clerks	335	\$34,280	Moderate-term on-the-job training
13-2052	Personal Financial Advisors	330	\$68,520	Bachelor's degree
41-2021	Counter and Rental Clerks	282	\$26,580	Short-term on-the-job training
11-3031	Financial Managers	280	\$93,280	Bachelor's or higher degree, plus work experience
43-6011	Executive Secretaries and Executive Administrative Assistants	258	\$43,040	Work experience in a related occupation
41-9021	Real Estate Brokers	252	\$38,220	Work experience in a related occupation
11-1021	General and Operations Managers	240	\$79,200	Bachelor's or higher degree, plus work experience
13-1041	Compliance Officers	240	\$59,360	Bachelor's degree

Source: QCEW Employees, Non-QCEW Employees & Self-Employed - EMSI 2013.4 Class of Worker

Note: Annual wages based on 2,000 hours per year

Historic 2008-2013

Business, Finance, and Insurance Cluster - Historic Occupation Growth (Top 20 Largest Growth)						
SOC	Occupation	2008 Jobs	2013 Jobs	# Change	% Change	
Total	All Cluster Occupations	15,008	15,316	308	2%	
43-3031	Bookkeeping, Accounting, and Auditing Clerks	496	575	79	16%	
13-2011	Accountants and Auditors	290	368	78	27%	
41-3021	Insurance Sales Agents	1,197	1,262	65	5%	
13-1161	Market Research Analysts and Marketing Specialists	130	181	51	39%	
13-1041	Compliance Officers	191	240	49	26%	
15-1142	Network and Computer Systems Administrators	104	143	39	38%	
49-9071	Maintenance and Repair Workers, General	389	423	34	9%	
15-1151	Computer User Support Specialists	89	118	29	33%	
43-6011	Executive Secretaries and Executive Administrative Assistants	231	258	27	12%	
11-2021	Marketing Managers	51	74	23	45%	
13-1071	Human Resources Specialists	51	73	22	43%	
11-1021	General and Operations Managers	219	240	21	10%	
13-1151	Training and Development Specialists	67	85	18	27%	
11-3021	Computer and Information Systems Managers	59	76	17	29%	
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	21	37	16	76%	
13-2052	Personal Financial Advisors	315	330	15	5%	
13-2051	Financial Analysts	188	203	15	8%	

Target Sector & Cluster Analysis – Appendix D

15-1132	Software Developers, Applications	70	84	14	20%
43-3051	Payroll and Timekeeping Clerks	15	28	13	87%
13-2072	Loan Officers	366	378	12	3%

Source: QCEW Employees, Non-QCEW Employees & Self-Employed - EMSI 2013.4 Class of

Worker

Projected 2013-2023

Busine	ss, Finance, and Insurance Cluster - Projecte	d Occupation	n Growth (Top 20 Larg	est Growth)
SOC	Occupation	2013 Jobs	2023 Jobs	# Change	% Change
Total	All Cluster Occupations	15,316	16,056	740	5%
49-9071	Maintenance and Repair Workers, General	423	488	65	15%
13-2052	Personal Financial Advisors	330	387	57	17%
13-2011	Accountants and Auditors	368	420	52	14%
41-3031	Securities, Commodities, and Financial Services Sales Agents	715	760	45	6%
13-1161	Market Research Analysts and Marketing Specialists	181	224	43	24%
43-3031	Bookkeeping, Accounting, and Auditing Clerks	575	607	32	6%
43-9061	Office Clerks, General	170	201	31	18%
13-1041	Compliance Officers	240	267	27	11%
15-1142	Network and Computer Systems Administrators	143	168	25	17%
41-2021	Counter and Rental Clerks	282	306	24	9%
43-4051	Customer Service Representatives	688	710	22	3%
13-2051	Financial Analysts	203	223	20	10%
37-2011	Janitors and Cleaners, Except Maids and Housekeeping Cleaners	178	197	19	11%
13-2072	Loan Officers	378	396	18	5%
13-1071	Human Resources Specialists	73	89	16	22%
15-1151	Computer User Support Specialists	118	130	12	10%
43-6011	Executive Secretaries and Executive Administrative Assistants	258	270	12	5%
13-1151	Training and Development Specialists	85	97	12	14%
37-3011	Landscaping and Groundskeeping Workers	84	96	12	14%
11-3021	Computer and Information Systems Managers	76	87	11	14%

Source: QCEW Employees, Non-QCEW Employees & Self-Employed - EMSI 2013.4 Class of

Worker

Market Research

Particular attention must be paid to the captive insurance industry, which has seen success in Vermont due to the State's support of the captive industry and ability to evolve captive legislation as necessary.

The State's Department of Financial Regulation (DFR) defines captive insurance as a "subsidiary corporation established to provide insurance to the parent company and its affiliates. A captive insurance company represents an option for many corporations and groups that want to take financial control and manage risks by underwriting their own insurance rather than paying premiums to third-party insurers". The DFR goes on to report that "there are over 900 companies licensed in Vermont for captive insurance operations and Vermont ranks as the number one captive domicile in the United States and the number three ranked domicile internationally." ⁷⁶

Examples of companies operating within this cluster include Cigna Health Corporation, Peerless Insurance Company, Crossroads Realty Holdings LLC, RHM Holding Co, Edgewood Holdings, Vermont Agricultural Credit Corporation, Yankee Farm Credit, Spruce Mortgage, Wells Fargo Home Mortgage, TD Bank, and Peoples Trust Company.

Insights from Previous Reports

A review of previous reports was conducted and there were no specific recommendations related to this cluster.

ADDITIONAL RESEARCH

PRIVATE EDUCATION

Cluster Description

	Private Education Cluster					
NAICS Code	Description					
611110	Elementary and Secondary Schools (Private)					
611210	Junior Colleges (Private)					
611310	Colleges, Universities, and Professional Schools (Private)					
611410	Business and Secretarial Schools (Private)					
611420	Computer Training (Private)					
611430	Professional and Management Development Training (Private)					
611511	Cosmetology and Barber Schools (Private)					
611512	Flight Training (Private)					
611513	Apprenticeship Training (Private)					
611519	Other Technical and Trade Schools (Private)					
611610	Fine Arts Schools (Private)					
611620	Sports and Recreation Instruction (Private)					
611630	Language Schools (Private)					
611691	Exam Preparation and Tutoring (Private)					
611699	All Other Miscellaneous Schools and Instruction (Private)					
611710	Educational Support Services (Private)					

⁷⁶Vermont Department of Financial Regulation. Advantages of Captive Insurance website. http://www.dfr.vermont.gov/captives/advantages-captive-insurance Target Sector & Cluster Analysis – Appendix D

Summary and Conclusions

Assets

- Historic and projected growth
- Fits well with Vermont's focus on quality and niche markets
- Higher than average employees per establishment
- Brings new people into the state

Challenges

- Lower than average wages for many occupations
- Retention of students beyond graduation

Data Findings

In 2013, employment in the Private Education Cluster accounted for 4.56% of total employment in Vermont, or 16,266 total jobs.

In 2012, the latest year for which establishment data is available, there were 397 total establishments in the Private Education Cluster in Vermont. The average establishment size in the Private Education Cluster was 41 employees per establishment which is much larger than the average for all establishments in the State.

The Location Quotient analysis identifies Colleges, Universities and Professional Schools (Private), Elementary and Secondary Schools (Private), Educational Support Services (Private), Fine Arts Schools (Private), Junior Colleges (Private), Language Schools (Private), All Other Miscellaneous Schools and Instruction, and Professional and Management Development Training (Private) as having employment concentrations significantly higher than the national average.

Between 2008 and 2013 the Private Education Cluster gained 1,154 jobs (8% increase). Colleges, Universities and Professional Schools (Private) saw the largest gain, adding over 2,000 jobs. Looking over the next 10 years, the Cluster is projected to continue with steady growth, adding another 1,898 jobs by 2023.

In 2013 occupations with the largest numbers of jobs in the Private Education Cluster include Postsecondary Teachers (1,939 jobs) and Secretaries and Administrative Assistants (1,234 jobs).

Average wages in the Private Education Cluster are lower than wages in all industries in Vermont which in 2013 were \$38,401 on average annually.

Existing Conditions

	Private Education Cluster - Current Employment and Establishments									
NAICS Code	Description	2013 Jobs	% of Cluster	% of VT Jobs	# of Est.	Emp. per Est.	LQ			
611310	Colleges, Universities, and Professional Schools (Private)	9,680	59.51%	2.71%	32	303	2.22			
611110	Elementary and Secondary Schools (Private)	3,783	23.26%	1.06%	77	49	1.58			
611710	Educational Support Services (Private)	441	2.71%	0.12%	63	7	1.23			
611610	Fine Arts Schools (Private)	429	2.64%	0.12%	41	10	1.48			

611620	Sports and Recreation Instruction (Private)	346	2.13%	0.10%	45	8	1.00
611210	Junior Colleges (Private)	338	2.08%	0.09%	2	169	1.64
611699	All Other Miscellaneous Schools and Instruction (Private)	324	1.99%	0.09%	44	7	1.90
611691	Exam Preparation and Tutoring (Private)	261	1.60%	0.07%	28	9	0.94
611630	Language Schools (Private)	227	1.40%	0.06%	4	57	4.09
611430	Professional and Management Development Training (Private)	169	1.04%	0.05%	29	6	1.62
611519	Other Technical and Trade Schools (Private)	158	0.97%	0.04%	16	10	0.90
611511	Cosmetology and Barber Schools (Private)	48	0.30%	0.01%	3	16	0.93
611420	Computer Training (Private)	27	0.17%	0.01%	9	3	0.70
611512	Flight Training (Private)	19	0.12%	0.01%	3	6	0.50
611513	Apprenticeship Training (Private)	13	0.08%	0.00%	2	7	0.42
Private E	ducation Cluster Total	16,266	100.00%	4.56%	397	41	

Source: QCEW Employees, Non-QCEW Employees & Self-Employed - EMSI 2013.4 Class of Worker

Note: Industries with fewer than 10 employees not included

Industry Data

Historic 2008-2013

	Private Education Cluster - Historic Growth						
NAICS	Description	2008 Jobs	2013 Jobs	# Change	% Change		
611310	Colleges, Universities, and Professional Schools (Private)	7,642	9,680	2,038	27%		
611110	Elementary and Secondary Schools (Private)	3,569	3,783	214	6%		
611699	All Other Miscellaneous Schools and Instruction (Private)	222	324	102	46%		
611710	Educational Support Services (Private)	347	441	94	27%		
611620	Sports and Recreation Instruction (Private)	268	346	78	29%		
611610	Fine Arts Schools (Private)		429	64	18%		
611511	Cosmetology and Barber Schools (Private)	40	48	8	20%		
611691	Exam Preparation and Tutoring (Private)	257	261	4	2%		
611513	Apprenticeship Training (Private)	11	13	2	18%		
611430	Professional and Management Development Training (Private)	172	169	(3)	-2%		
611420	Computer Training (Private)	89	27	(62)	-70%		
611630	Language Schools (Private)	302	227	(75)	-25%		
611519	Other Technical and Trade Schools (Private)	331	158	(173)	-52%		
611210	Junior Colleges (Private)	1,484	338	(1,146)	-77%		
Private E	ducation Cluster Total	15,112	16,266	1,154	8%		

Source: QCEW Employees, Non-QCEW Employees & Self-Employed - EMSI 2013.4 Class of Worker Note: Industries with fewer than 10 employees in 2008 and 2013 not included. For industries with fewer than 10 employees in only one year, analyst assumes 5 employees for purposes of calculation.

Projected 2013-2023

	Private Education Cluster - Projected Growth						
NAICS	Description	2013 Jobs	2023 Jobs	# Change	% Change		
611310	Colleges, Universities, and Professional Schools (Private)	9,680	11,634	1,954	20%		
611710	Educational Support Services (Private)	441	552	111	25%		
611110	Elementary and Secondary Schools (Private)	3,783	3,892	109	3%		
611699	All Other Miscellaneous Schools and Instruction (Private)	324	427	103	32%		
611610	Fine Arts Schools (Private)	429	509	80	19%		
611620	Sports and Recreation Instruction (Private)	346	373	27	8%		
611511	Cosmetology and Barber Schools (Private)	48	65	17	35%		
611430	Professional and Management Development Training (Private)	169	184	15	9%		
611512	Flight Training (Private)	19	25	6	32%		
611420	Computer Training (Private)	27	32	5	19%		
611513	Apprenticeship Training (Private)	13	16	3	23%		
611691	Exam Preparation and Tutoring (Private)	261	248	(13)	-5%		
611630	Language Schools (Private)	227	184	(43)	-19%		
611519	Other Technical and Trade Schools (Private)	158	20	(138)	-87%		
Private E	ducation Cluster Total	16,266	18,164	1,898	12%		

Source: QCEW Employees, Non-QCEW Employees & Self-Employed - EMSI 2013.4 Class of Worker Note: Industries with fewer than 10 employees in 2008 and 2013 not included. For industries with fewer than 10 employees in only one year, analyst assumes 5 employees for purposes of calculation.

Occupation Data

	Private Education Cluster - Occupation Analysis (20 largest)								
SOC	Occupation	2013 Jobs	Annual Wages	Education Required					
25-1099	Postsecondary Teachers	1,939	\$73,760	Doctoral degree					
43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	1,234	\$29,900	Short-term on-the-job training					
43-9061	Office Clerks, General	895	\$26,220	Short-term on-the-job training					
25-9041	Teacher Assistants	879	\$25,440	Short-term on-the-job training					
37-2011	Janitors and Cleaners, Except Maids and Housekeeping Cleaners	685	\$23,820	Short-term on-the-job training					
27-2022	Coaches and Scouts	633	\$22,020	Long-term on-the-job training					
25-3021	Self-Enrichment Education Teachers	602	\$40,360	Work experience in a related occupation					
25-2021	Elementary School Teachers, Except Special Education	569	\$49,180	Bachelor's degree					

25-2031	Secondary School Teachers, Except Special and Career/Technical Education	491	\$50,440	Bachelor's degree
11-9033	Education Administrators, Postsecondary	294	\$59,060	Master's degree
49-9071	Maintenance and Repair Workers, General	287	\$33,840	Moderate-term on-the-job training
43-3031	Bookkeeping, Accounting, and Auditing Clerks	286	\$33,200	Moderate-term on-the-job training
25-3099	Teachers and Instructors, All Other	279	\$36,580	Bachelor's degree
43-9199	Office and Administrative Support Workers, All Other	249	\$35,740	Short-term on-the-job training
15-1151	Computer User Support Specialists	239	\$41,980	Associate's degree
33-9032	Security Guards	238	\$28,160	Short-term on-the-job training
25-2022	Middle School Teachers, Except Special and Career/Technical Education	237	\$50,380	Bachelor's degree
25-3098	Substitute Teachers	195	\$22,140	Bachelor's degree
21-1012	Educational, Guidance, School, and Vocational Counselors	192	\$46,860	Master's degree
43-6011	Executive Secretaries and Executive Administrative Assistants	186	\$43,040	Work experience in a related occupation

Source: QCEW Employees, Non-QCEW Employees & Self-Employed - EMSI 2013.4 Class of Worker

Note: Annual wages based on 2,000 hours per

year

Historic 2008-2013

	Private Education Cluster - Historic Occupation Growth (Top 20 Largest Growth)								
SOC	Occupation	2008 Jobs	2013 Jobs	# Change	% Change				
Total	All Cluster Occupations	14,389	15,451	1,062	7%				
27-2022	Coaches and Scouts	524	633	109	21%				
37-2011	Janitors and Cleaners, Except Maids and Housekeeping Cleaners	579	685	106	18%				
43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	1,135	1,234	99	9%				
43-9061	Office Clerks, General	818	895	77	9%				
25-3021	Self-Enrichment Education Teachers	541	602	61	11%				
25-2021	Elementary School Teachers, Except Special Education	512	569	57	11%				
25-3099	Teachers and Instructors, All Other	238	279	41	17%				
33-9032	Security Guards	198	238	40	20%				
49-9071	Maintenance and Repair Workers, General	253	287	34	13%				
43-4121	Library Assistants, Clerical	120	148	28	23%				

15-1151	Computer User Support Specialists	213	239	26	12%
25-2022	Middle School Teachers, Except Special and Career/Technical Education	213	237	24	11%
37-3011	Landscaping and Groundskeeping Workers	121	144	23	19%
25-2031	Secondary School Teachers, Except Special and Career/Technical Education	469	491	22	5%
43-9199	Office and Administrative Support Workers, All Other	229	249	20	9%
39-9041	Residential Advisors	94	114	20	21%
13-1131	Fundraisers	81	101	20	25%
43-3031	Bookkeeping, Accounting, and Auditing Clerks	268	286	18	7%
25-4031	Library Technicians	124	142	18	15%
25-9041	Teacher Assistants	862	879	17	2%

Source: QCEW Employees, Non-QCEW Employees & Self-Employed - EMSI 2013.4 Class of Worker

Projected 2013-2023

	Private Education Cluster - Projected Occu	upation Growt	th (Top 20 l	_argest Growt	th)
SOC	Occupation	2013 Jobs	2023 Jobs	# Change	% Change
Total	All Cluster Occupations	15,451	17,358	1,907	12%
25-1099	Postsecondary Teachers	1,939	2,279	340	18%
43-9061	Office Clerks, General	895	1,020	125	14%
27-2022	Coaches and Scouts	633	740	107	17%
37-2011	Janitors and Cleaners, Except Maids and Housekeeping Cleaners	685	788	103	15%
43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	1,234	1,287	53	4%
25-2021	Elementary School Teachers, Except Special Education	569	619	50	9%
25-3099	Teachers and Instructors, All Other	279	329	50	18%
11-9033	Education Administrators, Postsecondary	294	337	43	15%
21-1012	Educational, Guidance, School, and Vocational Counselors	192	235	43	22%
25-3021	Self-Enrichment Education Teachers	602	641	39	6%
33-9032	Security Guards	238	277	39	16%
49-9071	Maintenance and Repair Workers, General	287	325	38	13%
43-9199	Office and Administrative Support Workers, All Other	249	283	34	14%
15-1151	Computer User Support Specialists	239	266	27	11%
25-9031	Instructional Coordinators	151	175	24	16%

43-3031	Bookkeeping, Accounting, and Auditing Clerks	286	309	23	8%
25-2022	Middle School Teachers, Except Special and Career/Technical Education	237	259	22	9%
43-4121	Library Assistants, Clerical	148	169	21	14%
37-3011	Landscaping and Groundskeeping Workers	144	165	21	15%
39-9041	Residential Advisors	114	132	18	16%

Source: QCEW Employees, Non-QCEW Employees & Self-Employed - EMSI 2013.4 Class of

Worker

ATTACHMENT A – MARKET RESEARCH

Energy Cluster: Environmental Consulting

INDUSTRY DEFINITION

This industry provides advice to businesses and federal governments on environmental issues, such as controlling environmental contamination from pollutants, toxic substances and hazardous materials. Environmental consultants identify problems, measure and evaluate risks and recommend solutions. The industry employs a multidisciplined staff of scientists, engineers and other technicians.

The North American Industry Classification System (NAICS) code for this industry is:

• 541620 Environmental Consulting Services

SIMILAR INDUSTRIES

Industries, including their NAICS codes (2007), which have similar workforce, services and other similarities to this industry are:

- **54133 Engineering Services**: Companies in this industry apply physical laws and principles of engineering in designing different materials and technologies.
- **54169 Scientific & Economic Consulting:** Companies in this industry provide advice and assistance to businesses and other organizations on scientific and technical issues.
- **56291 Remediation & Environmental Cleanup Services**: Companies in this industry are engaged in environmental remediation and cleanup.

TREND SUMMARY

Firms in the Environmental Consulting industry provide advisory services such as environmental assessments, site remediation planning, waste management and natural resource management services. Firms assist construction, manufacturing and other industries to mitigate their impact on the surrounding environment and navigate changing legislation and regulation. Industry staff includes scientists, engineers and other technicians with experience in fields such as air and water quality.

The industry has experienced moderate growth over the past five years because of a growing emphasis on environmental sustainable behaviors. Consumers and organizations are becoming increasingly focused on reducing the impact of business and daily life on the environment. However, growth was hindered over the five years to 2013 by collapsing corporate profit and weak construction levels in 2008 and 2009. Industry revenue slowed in 2008 before falling 4.6% in 2009, as the private sector reduced investment and slashed expenses like environmental consultants. Economic conditions have since improved, and the industry has benefited from improving private investment. Furthermore, indirect

government assistance such as the American Recovery and Reinvestment Act has helped the industry recover. Disasters such as the BP oil spill have also boosted demand for consultants due to the need for emergency site remediation planning and cleanups. As a result, industry revenue is projected to grow by 2.7% over the five years to 2013. Growth is expected to continue in 2013 with a 3.9% increase to \$16.6 billion.

The future of environmental consulting is promising. Increased environmental regulations are anticipated, particularly in the areas of oil drilling and energy dependence. Customers will increasingly demand the industry's services for advice about drilling offshore and for aid in becoming more energy-efficient and adopting renewable energy. Corporate profit is expected to grow at an average annual rate of 4.3% over the next five years through 2018, allowing companies to allocate more resources toward implementing sustainable practices and promoting positive public images. Industry firms will also aid construction companies to meet new environmental standards as construction activity picks up. Consequently, revenue is forecast to grow at an average rate of 5.9% per year to total \$22.2 billion in the five years to 2018.

The information in this section is sourced directly and solely from IBISWorld.

INDUSTRY IN VERMONT

Industry Trends

	Shift Share Analysis										
NAICS	Description	2013	2018	Ind Mix	Nat Growth	Expected	Competitive				
Code	Description	Jobs	Jobs	Effect	Effect	Change	Effect				
541620	Environmental Consulting Services	581	768	55	31	86	101				

Source: EMSI

Energy Cluster: Biomass Power

INDUSTRY DEFINITION

Firms in this industry operate electricity generating facilities (other than wind power and solar power), using biomass (e.g. agricultural byproducts, landfill gas and biogenic municipal waste).

The North American Industry Classification System (NAICS) code for this industry is:

221117 Electric power generation, biomass

SIMILAR OR RELATED INDUSTRIES

Industries, including their NAICS codes (2007), which have similar workforce, services and other similarities to this industry are:

- **22112 Electric Power Transmission:** Companies in this industry transmit and distribute electricity.
- **22111 Coal & Natural Gas Power:** This industry generates electricity from fuels like coal and gas.
- **22111 Hydroelectric Power:** This industry generates hydroelectricity and also produces electricity from renewable fuels like biomass.
- 22111 Wind Power: Companies in this industry operate wind farms, which consist of windoperated turbines that are used to generate electricity

TREND SUMMARY

The Biomass Power industry has grown at a healthy rate in the five years to 2013. The federal government has propelled this growth with the implementation of tax credits through several pieces of legislation, including the American Recovery and Reinvestment Act of 2009, that encourage the expansion of biomass power facilities. Furthermore, the majority of states have enacted renewable portfolio standards (RPSs), which require local utilities to generate electricity from renewable power as a percentage of their total energy portfolio. Increased campaigning for green technology also has influenced industry performance by sparking interest in technologies that replace pollutant-generating energy sources, such as coal and gas. As a result, industry revenue is expected to increase at an annualized rate of 9.5% over the five years to 2013 to total \$820.3 million, including an 8.8% jump in 2013.

Federal government assistance and local government regulation regarding renewable energy has led to considerable growth in biomass power projects. The increase in projects reflects a triumph for government assistance in the industry, which normally meets difficulty competing against traditional energy-generation commodities, such as natural gas and oil. The assistance, provided in the form of federal tax credits and RPSs, has boosted biomass-electricity generation and helped it reach a level where it can compete with traditional energy sources. However, federal production tax credits for biomass power are set to expire at the end of 2013, which is expected to hinder growth going forward. Furthermore, many states have found that emissions from biomass power generation actually exceed those of coal power generation, which will likely diminish RPSs that directly benefit biomass power over the next five years.

Nevertheless, state and local government assistance is expected to continue to help industry players compete with other energy-generation technologies in the next five years by lowering the cost of biomass projects. Additionally, the anticipated economic recovery over the next five years will contribute to more robust demand for electricity generators. As a result, industry firms are expected to benefit from the continued push toward renewable-power generation, which will lead to increased biomass-power output. Given these conditions, industry revenue is forecast to increase at an annualized rate of 4.7% per year over the next five years to total \$1.0 billion in 2018.

The information in this section is sourced directly and solely from IBISWorld.

INDUSTRY IN VERMONT

Industry Trends

	Shift Share Analysis						
NAICS	Description	2013	2018	Ind Mix	Nat Growth	Expected	Competitive
Code	Description	Jobs	Jobs	Effect	Effect	Change	Effect
22111	Electric Power Generation	477	537	-348	75	-273	334

Source: EMSI

Energy Cluster: Navigational, Measuring and Control Instruments Manufacturing INDUSTRY DEFINITION

The industry primarily manufactures navigational, measuring and control instruments. Its products include aeronautical instruments, appliance regulators and controls (except switches), laboratory analytical instruments, navigation and guidance systems, and physical properties testing equipment.

The North American Industry Classification System (NAICS) codes for this industry are:

• 334511 Search, Detection, Navigation, Guidance, Aeronautical, and Nautical System and Instrument Manufacturing

Target Sector & Cluster Analysis – Appendix D

•	334512	Automatic Environmental Control Manufacturing for Residential, Commercial, and Appliance Use
•	334513	Instruments and Related Products Manufacturing for Measuring, Displaying, and Controlling Industrial Process Variables
•	334514	Totalizing Fluid Meter and Counting Device Manufacturing
•	334515	Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals
•	334516	Analytical Laboratory Instrument Manufacturing
•	334519 *	Other Measuring and Controlling Device Manufacturing

^{*} Principal target for Vermont

SIMILAR INDUSTRIES

Industries, including their NAICS codes (2007), which have similar workforce, supply chains, product and other similarities to this industry are:

- 32619 Plastic Products Miscellaneous Manufacturing: This industry manufactures plastic products.
- 32721 Glass Product Manufacturing: This industry manufactures glass products.
- **33331 Copier & Optical Machinery Manufacturing:** This industry manufactures commercial machinery like copy machines.
- **33422 Communication Equipment Manufacturing:** This industry manufactures communication equipment.
- **33429 Alarm, Horn & Traffic Control Equipment Manufacturing:** This industry manufactures alarms, horns and traffic control equipment.
- 33451 Medical Device Manufacturing: This industry manufactures medical devices.
- 33531 Electrical Equipment Manufacturing: This industry manufactures electrical equipment.
- 33593 Wiring Device Manufacturing: This industry manufactures wiring devices.
- **33911 Medical Instrument & Supply Manufacturing:** This industry manufactures medical instruments and supplies.

TREND SUMMARY

The Navigational Instrument Manufacturing industry produces various products, ranging from search, detection and navigational instruments to electricity measuring and testing equipment. The industry has a diverse customer base. Air-traffic controllers, pilots and sea captains use navigational equipment in stationary compasses and electronic guidance systems. Laboratories, spaceships, planes and buildings employ electricity measuring and testing devices. Physicians and medical researchers use the industry's diagnostic instruments. Because revenue stems from a wide customer base, the industry has experienced only moderate volatility since 2008.

Tight lending conditions and weak demand from downstream markets during the Great Recession caused revenue to contract 4.8% in 2009. In 2010, this trend reversed, with revenue increasing 6.4%. In 2013, growth is expected to continue, with revenue rising 2.4% due to further improvements in downstream manufacturing activity and corporate profit, the latter of which correlates with investment in the research and development (R&D) of industry products. IBISWorld expects revenue to increase at an average annual rate of 1.1% to \$56.4 billion over the five years through 2013.

Industry growth depends on conditions within downstream markets, technology advancements and trade. Companies rely heavily on patents, trademarks, copyrights and trade secrets, as well as confidentiality agreements to establish and protect proprietary technology and new product innovations. Industry firms invest a great deal in R&D to develop products, and the scale of this activity depends on a company's cash flow and overall size. Additionally, as the value of the U.S. dollar increases, imports become cheaper. The dollar's appreciation over the past five years has helped raise import volumes and heighten competition against this industry's products.

In the five years to 2018, industry revenue is forecast to increase at an annualized rate of 2.7% to \$64.6 billion. An increase in R&D funding as a result of expanding budgets will drive product advancement during this period, which will elevate the already strong increase in demand from growing downstream industries. However, industry exports will continue to decline due to an appreciating dollar and lower

cost products made abroad, which will weaken revenue growth. These conditions will also help competing imports gain market share, as they will grow from 12.2% to 16.9% of domestic demand.

The information in this section is sourced directly and solely from IBISWorld.

INDUSTRY IN VERMONT

Industry Trends

	5	Shift Share	Analysis	3			
NAICS Code	Description	2013 Jobs	2018 Jobs	Ind Mix Effect	Nat Growth Effect	Expected Change	Competitive Effect
334511	Search, Detection, Navigation, Guidance, Aeronautical, and Nautical System and Instrument Manufacturing	16	157	(5)	3	(2)	143
334512	Automatic Environmental Control Manufacturing for Residential, Commercial, and Appliance Use	66	0	(56)	10	(46)	(21)
334513	Instruments and Related Products Manufacturing for Measuring, Displaying, and Controlling Industrial Process Variables	29	94	(5)	5	0	66
334514	Totalizing Fluid Meter and Counting Device Manufacturing	<10	<10	(6)	1	(5)	(4)
334515	Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals	0	<10	(1)	0	(1)	2
334516	Analytical Laboratory Instrument Manufacturing	25	163	(2)	4	2	137
334519	Other Measuring and Controlling Device Manufacturing	793	983	(82)	124	42	148

Source: EMSI

Energy Cluster: Scientific and Economic Consulting Industry Definition

Companies in this industry provide advice and assistance to businesses and other organizations on scientific and technical issues. The industry includes a range of specialist consulting activities, primarily in the areas of economic, energy and mineral, security, and agricultural analysis. This industry excludes establishments that derive their revenue primarily from environmental consulting and remediation, geophysical surveying and mapping, or oil and gas exploration.

The primary disciplines within this industry are:

- Economic consulting services
- Agricultural, agrology and agronomy consulting services
- Biological consulting services

- Horticultural consulting services
- Livestock breeding consulting services
- Alternative energy consulting services

- Scientific (i.e. physics/chemistry) consulting services
- Energy consulting services

- Safety consulting services
- Security consulting services

The North American Industry Classification System (NAICS) code for this industry is:

• 541690 Other Scientific and Technical Consulting Services

SIMILAR INDUSTRIES

Industries, including their NAICS codes (2007), which have similar workforce, services and other similarities to this industry are:

- **54133 Engineering Services:** Engineering consultants provide services related to structures, machines, materials, and systems; they are distinguished from this industry by their reliance on physical and engineering principles.
- **54161 Management Consulting**: Management consultants' expertise centers on the operations of a business, which is distinct from the more academic advice provided by this industry.
- **54162 Environmental Consulting**: Environmental consulting shares a great deal in common with this industry, but it focuses more on the environmental impact of a client's activities.

TREND SUMMARY

The Scientific and Economic Consulting industry has experienced impressive growth over the past five years, weathering an economy that nearly toppled a number of related industries. The industry's diverse range of markets with varying degrees of specialization in products and services have allowed it to sustain growth in a period of difficult economic conditions. The industry experienced losses in 2008; however, increasing demand from the federal government and private firms seeking greater assistance provided new opportunities. Additionally, the industry grew as a result of increased demand from mining and energy firms that required feasibility studies and other advisory services. Outside of declines in 2008, the industry has experienced a rising number of businesses, particularly non-employers (i.e. sole practitioners). These firms have taken advantage of low barriers to entry to capture high industry profit margins. Overall, the industry is forecast to grow by an average annual rate of 6.2% over the five years to 2013.

In 2013, the industry is expected to grow due to increasing corporate profit and, consequently, rising investment. Growth may be slightly mitigated by austerity measures enacted by the federal government. Furthermore, budget sequestration (automatic spending cuts caused by large budget deficits) is expected to slow growth. As a result, industry revenue is expected to grow by 4.2% to \$27.4 billion in 2013, lagging slightly behind 2012 growth rates.

Improving economic conditions are expected to provide the industry with stronger growth over the next five years. Improving consumer sentiment and household disposable income is forecast to increase corporate profit margins, creating demand for scientific and economic consultants. Specialized areas of consulting, such as genomics and pharmaceuticals, are also likely to be a source of strong growth for consultants in this industry. In addition, firms are expected to become more profitable over the next five years, attracting numerous new firms to enter the industry. Larger players are expected to pursue mergers and acquisitions to increase market share; however, the industry will remain highly fragmented due to an increase in the number of non-employer firms. As a result, the industry is projected to grow by an annualized rate of 6.5% over the five years through 2018 to \$37.5 billion.

The information in this section is sourced directly and solely from IBISWorld.

INDUSTRY IN VERMONT

Industry Trends

		Shift Share	Analysis	;			
NAICS Code	Description	2013 Jobs	2018 Jobs	Ind Mix Effect	Nat Growth Effect	Expected Change	Competitive Effect
541690	Other Scientific and Technical Consulting Services	739	928	203	40	243	(53)

Source: EMSI

Energy Cluster: Solar Power

INDUSTRY DEFINITION

Firms in this industry own and operate solar-power generating facilities in the form of either photovoltaic panels or solar thermal power stations that make use of mirrors or lenses to concentrate the sun's energy. Firms then sell the energy to downstream customers. Solar farms are within this industry.

The North American Industry Classification System (NAICS) code for this industry is:

• 221114 Power generation, solar electric

SIMILAR OR RELATED INDUSTRIES

Industries, including their NAICS codes (2007), which have similar workforce, services and other similarities to this industry are:

- 22112 Electric Power Transmission: Companies in this industry transmit and distribute electricity.
- **22111 Coal & Natural Gas Power:** This industry generates electricity from fuels like coal and gas.
- **22111 Nuclear Power:** Companies in this industry generate electricity in nuclear power stations
- **22111 Hydroelectric Power:** This industry generates hydroelectricity and also produces electricity from renewable fuels like biomass.
- 22111 Wind Power: Companies in this industry operate wind farms, which consist of windoperated turbines that are used to generate electricity
- **237130 Solar Power Structure Construction:** This industry comprises establishments primarily engaged in the construction of power lines and towers, power plants, and radio, television, and telecommunications transmitting/receiving towers.
- 237130 Alternative Energy (e.g., geothermal, ocean wave, solar, wind) structure
 construction: This industry comprises establishments primarily engaged in the construction of
 power lines and towers, power plants, and radio, television, and telecommunications
 transmitting/receiving towers.
- **238160 Solar Reflecting Coating, Roof, Application:** This industry comprises establishments primarily engaged in roofing. This industry also includes establishments treating roofs (i.e., spraying, painting, or coating) and installing skylights.
- **238220 Solar Heating Equipment Installation:** This industry comprises establishments primarily engaged in installing and servicing plumbing, heating, and air-conditioning equipment.

- 333414 Solar Heating Systems Manufacturing: This U.S. industry comprises establishments
 primarily engaged in manufacturing heating equipment (except electric and warm air furnaces),
 such as heating boilers, heating stoves, floor and wall furnaces, and wall and baseboard heating
 units.
- **334413 Solar Cells Manufacturing:** This U.S. industry comprises establishments primarily engaged in manufacturing semiconductors and related solid state devices.
- 334519- Solarimeters Manufacturing: This U.S. industry comprises establishments primarily engaged in manufacturing measuring and controlling devices (except search, detection, navigation, guidance, aeronautical, and nautical instruments and systems; automatic environmental controls for residential, commercial, and appliance use; instruments for measurement, display, and control of industrial process variables; totalizing fluid meters and counting devices; instruments for measuring and testing electricity and electrical signals; analytical laboratory instruments; irradiation equipment; and electromedical and electrotherapeutic apparatus).

TREND SUMMARY

The Solar Power industry has experienced gains over the five years to 2013. Generous government incentives have propelled revenue growth by enacting renewable portfolio standards (RPSs) and providing tax credits for companies that invest in solar power. These standards, implemented in 30 states, require local utilities to generate electricity from renewable power as a percentage of their total energy portfolio. Increased campaigning for green technology has also influenced industry performance by sparking interest in technologies that replace pollutant-generating energy sources (coal and gas). In light of these trends, industry revenue is expected to grow at an average annual rate of 28.7% over the five years to 2013 to total \$165.2 million, including a 10.1% jump in 2013.

Federal government assistance and local government regulation for renewable energy has led to strong growth in US solar power projects. The increase in projects reflects a triumph for government assistance in the industry, which normally has difficulty competing against traditional energy-generation commodities (such as natural gas and oil). The assistance, provided in the form of federal tax credits and RPSs, has pushed solar-electricity generation to new heights. Furthermore, the global recession caused a high demand for the global supply of silicon, which is used to manufacture solar panels. Chinese solar panel and module manufacturers were unable to sell their products at prerecession rates. As such, solar power producers acquired panels at cheaper prices. In turn, they experienced higher profit margins and undertook projects that otherwise would not have been profitable.

Government assistance will continue to help the industry compete with other energy-generation technologies in the next five years by lowering the cost of solar projects. State mandates for renewable-energy power will continue to translate into higher industry revenue. Additionally, recovering US economic growth in the five years to 2018 will contribute to more robust demand for electricity generators. As consumer income rises alongside business investment expenditure, demand for electricity will continue to increase. As a result, industry firms are expected to benefit from the continued push toward renewable-power generation, incurring increased solar-power output. Given these conditions, industry revenue is projected to grow an average 5.7% per year over the next five years to total \$217.6 million in 2018.

The information in this section is sourced directly and solely from IBISWorld.

INDUSTRY IN VERMONT

Industry Trends

	Shift Share Analysis						
NAICS	Description	2013	2018	Ind Mix	Nat Growth	Expected	Competitive
Code	Description	Jobs	Jobs	Effect	Effect	Change	Effect
22111	Electric Power Generation	477	537	(348)	75	(273)	334

Source: EMSI

Energy Cluster: Wind Power

INDUSTRY DEFINITION

Companies in this industry operate wind farms, which consist of wind-operated turbine used to generate electricity.

The North American Industry Classification System (NAICS) code for this industry is:

221115 Electric Power Generation, Wind

SIMILAR OR RELATED INDUSTRIES

Industries, including their NAICS codes (2007), which have similar workforce, services and other similarities to this industry are:

- 22112 Electric Power Transmission: Companies in this industry transmit and distribute electricity.
- **22111 Coal & Natural Gas Power:** This industry generates electricity from fuels like coal and gas.
- 22111 Nuclear Power: Companies in this industry generate electricity in nuclear power stations
- **22111 Hydroelectric Power:** This industry generates hydroelectricity and also produces electricity from renewable fuels like biomass.
- **22111 Solar Power:** This industry produces electricity using solar thermal plants or photovoltaic cells.
- 33361 Wind Turbine Installation: Companies in this industry manufacture wind turbine blades, towers, generators and related parts. Industry firms also provide maintenance and support services for installed wind turbines.
- Wind Turbine Installation (NAICS code not available): Companies within this Industry transport, construct and install wind power collection systems, such as turbines, substations and interconnections services. The work performed may include new work, reconstruction, rehabilitation, and ongoing maintenance and repairs

TREND SUMMARY

The Wind Power industry is booming. Revenue is expected to increase at an average annual rate of 16.9% to \$6.9 billion in the five years to 2013, including anticipated growth of 8.6% in 2013. Favorable government assistance has made this energy source cost competitive with other electricity-generation sources, lifting wind power's share of the total electricity generated in the United States from 0.4% in 2005 to 3.2% in 2012. The industry generates revenue from owning and operating wind farms and selling the energy produced to downstream customers.

The federal government's investment tax credits and state government mandates for renewable energy have made it attractive for operators to construct wind farms at a breakneck pace. These incentives lower the cost of wind power generation, ultimately making it cheaper for mandated utilities companies to purchase or invest in renewable energy. Cash credits for renewable energy investment were extended only until December 31, 2011, encouraging companies to open wind farms quickly before the expiration of the cash grant program. The production tax credit, a government-funded incentive that pays producers per unit of energy sold, has also aided this trend. The US Congress recently extended this credit as a part of the American Taxpayer Relief Act, following a brief expiration at the end of 2012.

Over the next five years, stronger economic activity and a focus on energy independence and reducing greenhouse gas emissions will contribute to strong ongoing growth in wind power production. Combined with favorable government assistance, the industry will ride the high winds as the economy kicks back in gear and electricity demand rises. A push for the creation of offshore wind farms is also expected to aid the Wind Power industry. The first such farm in the United States received federal clearance in August 2012. As a result of these trends, revenue in the Wind Power industry is expected to grow at an annualized rate of 9.6% to \$10.8 billion during the five years to 2018.

The information in this section is sourced directly and solely from IBISWorld.

INDUSTRY IN VERMONT

Industry Trends

	Shift Share Analysis						
NAICS	Description	2013	2018	Ind Mix	Nat Growth	Expected	Competitive
Code	Description	Jobs	Jobs	Effect	Effect	Change	Effect
22111	Electric Power Generation	477	537	(348)	75	(273)	334

Source: EMSI

Forestry and Wood Products Cluster: Cabinet and Vanity Manufacturing Industry Definition

This industry includes businesses that manufacture kitchen cabinets, bathroom vanities and countertops, primarily made of wood or wood coverings, but include plastics lamination. The cabinets and counters may be made on a stock or custom basis. Manufacturers distribute their products to wholesalers, contract outfitters and home improvement stores in the United States.

The North American Industry Classification System (NAICS) code for this industry is:

• 33711Wood Kitchen Cabinet and Countertop Manufacturing

SIMILAR INDUSTRIES

Industries, including their NAICS codes (2007), which have similar workforce, supply chains, product and other similarities to this industry are:

- **33712 Household Furniture Manufacturing:** Establishments in this industry manufacture kitchen and bathroom cabinets made of metal.
- 33721 Office Furniture Manufacturing: Operators in this industry manufacture wood or plastics laminated on wood countertops.
- **32619 Plastic Products Miscellaneous Manufacturing:** Operators in this industry manufacture countertops made of plastic.
- **32799 Mineral Product Manufacturing:** Businesses in this industry manufacture countertops made of stone.

TREND SUMMARY

The Cabinet and Vanity Manufacturing industry has been severely set back by prolonged and substantial declines in the home construction and remodeling markets. Homebuilders, architects, designers, retailers and consumers purchase most industry goods during the construction of new houses or as part of a kitchen or bath remodeling project. Unfortunately for the industry, these markets contracted significantly because of weak consumer spending and a severe drop in investment into single-family residential construction during and after the recession.

Industry revenue fell 15.6% in 2008 before declining an additional 30.3% the following year. Falling home prices also dampened consumer spending and the construction of new houses slowed. Industry revenue continued to decline in 2010, before finally turning the corner in 2011; however, post-recession growth thus far has not been strong enough to make up for the steep losses suffered during the economic downturn. In the five years to 2013, industry revenue is expected to decline at an annualized rate of 3.5% to \$13.9 billion.

Responding to this weakened demand, industry firms shut down manufacturing plants and slashed jobs. Between 2008 and 2013, the number of companies operating in the industry declined at an estimated average annual rate of 0.2% to 8,893. Industry employment is expected to fall at an annualized rate of 3.6% during the same period to 98,980 workers. Industry profit also was impacted by weak demand and the price volatility of certain commodities and raw materials; however, profit margins are up slightly during the period, thanks to stronger demand from residential construction markets during the past two years.

Revenue returned to growth in 2011 and is expected to expand 13.5% in 2013 over 2012 levels, as consumer spending grows and the housing market stabilizes. IBISWorld expects steady growth for the industry in the five years to 2018, with revenue projected to increase at an annualized rate of 4.1% to \$17.0 billion. Demographics will play a key role in the demand for housing, as a large segment of the population gearing up to enter the homeowners market encounters a limited inventory of new houses. As more people buy homes, housing starts will accelerate and demand for industry products will increase. Additionally, due to deferred maintenance during the downturn, a large number of properties will be in need of rehabilitation, which will include upgrades to kitchen cabinetry and bath vanities.

The information in this section is sourced directly and solely from IBISWorld.

INDUSTRY IN VERMONT

Industry Trends

		Shift Share	e Analysis	;			
NAICS	Description	2013	2018	Ind Mix	Nat Growth	Expected	Competitive
Code	Description	Jobs	Jobs	Effect	Effect	Change	Effect
33711	Wood Kitchen Cabinet and Countertop Manufacturing	196	503	(98)	31	(67)	375

Source: EMSI

Forestry and Wood Products Cluster: Household Furniture Manufacturing Industry Definition

This industry manufactures a range of furniture for personal, household and public use. Public furniture is used for hospitals, theaters, cafeterias, schools and other facilities. Furniture may be made on a stock or custom basis and may be sold assembled or unassembled.

The North American Industry Classification System (NAICS) codes for this industry are:

337121 Upholstered Household Furniture Manufacturing

Target Sector & Cluster Analysis – Appendix D

- 337122* Non-upholstered Wood Household Furniture Manufacturing
- 337124 Metal Household Furniture Manufacturing
- 337125 Household Furniture (except Wood and Metal) Manufacturing
- 337127 * Institutional Furniture Manufacturing
- 337129 Wood Television, Radio, and Sewing Machine Cabinet Manufacturing

SIMILAR INDUSTRIES

Industries, including their NAICS codes (2007), which have similar workforce, supply chains, product and other similarities to this industry are:

- 23551 Carpenters: This segment includes contractors that specialize in the installation of
 institutional furniture.
- **33711 Cabinet & Vanity Manufacturing**: This industry manufactures wood or plastics laminated on wood kitchen cabinets, bathroom vanities and countertops.
- **33721 Office Furniture Manufacturing**: This industry manufactures office-type furniture and office or store fixtures.
- **42321 Furniture Wholesaling**: This segment consists of establishments that wholesale furniture.
- **44211 Furniture Stores**: Furniture stores retail a range of household furniture, home electronics, home furnishings and floor coverings.
- 81142 Furniture Repair & Re-upholstery: This industry repairs or refinishes furniture.

TREND SUMMARY

In the five years to 2013, the Household Furniture Manufacturing industry suffered as consumer disposable income fell due to the effects of the recession. With less disposable income, consumers were forced to cut back on expenses, inhibiting industry growth. Additionally, the recession forced delays in housing starts, another major driver for the industry. Because the total number of homes influences the number of consumers in the market for new household furniture, when housing starts plummeted 35.6% in 2009, industry revenue subsequently fell 27.9%.

The growing prominence of import penetration, specifically from emerging economies (e.g. China), further hampered the industry's growth prospects. These countries' low labor and overhead costs allow them to offer lower prices on comparable products, effectively eroding domestic demand for US-made products. Consequently, industry revenue is expected to decline at an annualized rate of 4.9% in the five years to 2013. With revenue tightening, household furniture manufacturers have either consolidated to minimize overhead costs or exited the industry by offshoring production. To this end, the number of industry establishments is estimated to decrease at an annualized rate of 4.6% over the five-year period.

Despite these challenges, IBISWorld expects industry revenue to grow 6.3% to \$24.5 billion in 2013, driven by the revival of disposable income and housing starts. As disposable income increases, consumers are more likely to purchase new household furniture. Additionally, the rise in housing starts will fuel industry demand as consumers look to furnish their new homes. Nevertheless, industry operators will continue to face challenges over the next five years, despite anticipated growth early on. The expected rise in disposable income and housing starts will cause demand for household furniture to grow in the short-term, but the influx of low-cost imports is expected to thwart long-term gains. As a

^{*}Principal targets for Vermont

result, industry revenue is forecast to fall at an annualized rate of 1.1% in the five years to 2018 to \$23.1 billion.

The information in this section is sourced directly and solely from IBISWorld.

INDUSTRY IN VERMONT

Industry Trends

	5	Shift Share	Analysis	3			
NAICS Code	Description	2013 Jobs	2018 Jobs	Ind Mix Effect	Nat Growth Effect	Expected Change	Competitive Effect
337121	Upholstered Household Furniture Manufacturing	26	98	(16)	4	(12)	83
337122	Nonupholstered Wood Household Furniture Manufacturing	2398	159	(2556)	375	(2181)	(58)
337124	Metal Household Furniture Manufacturing	76	<10	(55)	12	(43)	(31)
337125	Household Furniture (except Wood and Metal) Manufacturing 26		20	(3)	4	1	(6)
337127	Institutional Furniture Manufacturing	55	127	(23)	9	(14)	86
337129	Wood Television, Radio, and Sewing Machine Cabinet Manufacturing	0	20	0	0	0	20

Source: EMSI

Forestry and Wood Products Cluster: Millwork Industry Definition

This industry manufactures hardwood and softwood cut stock and dimension stock (lumber and worked wood products cut or shaped into specific sizes); wood windows and doors; and other millwork including wood flooring. The reshaped wood products are sold mainly to housing and other building construction industries and their contractors, in addition to other wood product distributors.

- 321911 Wood Window and Door Manufacturing
- 321912 Cut Stock, Resawing Lumber, and Planing
- 321918 Other Millwork (including Flooring)

SIMILAR INDUSTRIES

Industries, including their NAICS codes (2007), which have similar workforce, supply chains, product and other similarities to this industry are:

- **32111 Sawmills & Wood Production:** This industry saws lumber, boards, beams, timber, poles, ties, shingles, shakes, siding and wood chips from logs or bolts.
- **32121 Wood Paneling Manufacturing:** This industry manufactures veneer and plywood, engineered wood products and reconstituted wood products.
- 42331 Lumber Wholesaling: This industry distributes lumber, plywood, reconstituted wood
 fiber products, wood fencing, doors and windows and their frames, wood roofing and siding and
 other wood or metal millwork.

 44413 - Hardware Stores: These stores retail a general line of new hardware items, such as tools and builders' hardware.

TREND SUMMARY

The Millwork industry has experienced challenging conditions, primarily due to the recent downturn in residential construction. Demand for industry products, which include wooden window frames, doors, floors and dimension stock (lumber and worked wood products cut or shaped into specific sizes), is primarily linked to the level of activity in residential construction markets and, to a lesser extent, commercial and industrial construction.

During 2008, housing starts plummeted, cutting into demand for the industry's wood products. Nonresidential construction also declined steadily through 2010, contributing to the industry's losses. However, with the recent turnaround in the construction market, demand for millwork products has begun to rebound. IBISWorld expects that revenue, buoyed by 25% growth in housing starts, will rise 13.6% in 2013. However, the industry's recent growth is not expected to offset recession-induced losses. Consequently, over the five years to 2013, revenue is estimated to decline at an annualized rate of 1.0% to \$24.8 billion.

Since mid-2006, falling residential construction activity has led to large-scale capacity reductions in the US wood product sector. Meanwhile, growth in developing economies has put pricing pressure on many key inputs for US millworkers, such as preservation chemicals and oil. These factors have restricted profitability for millworkers, forcing many to close. From 2008 to 2013, the number of companies is estimated to decrease at an annualized rate of 2.7% to 3,648.

The Millwork industry has also been challenged by rising competition from wood-substitute products. Windows and door frames made of fiberglass, aluminum, steel and vinyl have become increasingly popular due to their durability and lower price tags. Vinyl, a low-cost alternative to wood windows and door frames, is one of the fastest growing products in the window frame market according to the American Architectural Manufacturers Association.

Over the five years to 2018, conditions are expected to improve for operators, with revenue forecast to increase at an annualized rate of 6.4% to \$33.9 billion. Recovery of the residential construction market is expected to accelerate in 2014, reviving demand for the industry. Also, rising per capita disposable income following the recession will positively affect investment in remodeling activity. Nevertheless, the industry will continue to face competition from substitute products and low-cost imports.

The information in this section is sourced directly and solely from IBISWorld.

INDUSTRY IN VERMONT

Industry Trends

	Shift Share Analysis						
NAICS	Description	2013	2018	Ind Mix	Nat Growth	Expected	Competitive
Code	Description	Jobs	Jobs	Effect	Effect	Change	Effect
321911	Wood Window and Door Manufacturing	116	466	(75)	18	(57)	406
321912	Cut Stock, Resawing Lumber, and Planing	215	<10	(126)	34	(92)	(116)
321918	Other Millwork (including Flooring)	96	470	(65)	15	(50)	423

Source: EMSI

Forestry and Wood Products Cluster: Miscellaneous Wood Product Manufacturing INDUSTRY DEFINITION

This industry is composed of manufacturers of veneer, engineered wood, millwork wood or wood products that are not produced by sawmills. The industry includes miscellaneous wood products such as ladders, kitchenware, kiln-dried lumber, reels and toothpicks. It does not include wood containers, pallets or manufactured or prefabricated homes.

The North American Industry Classification System (NAICS) code for this industry is:

• 321999 All Other Miscellaneous Wood Product Manufacturing

SIMILAR INDUSTRIES

Industries, including their NAICS codes (2007), which have similar workforce, supply chains, product and other similarities to this industry are:

- **32111 Sawmills & Wood Production:** This industry includes establishments primarily engaged in sawmilling and preservation of wood.
- **32121 Wood Paneling Manufacturing:** This industry includes establishments primarily engaged in manufacturing veneer and engineered wood products.
- **32191 Millwork:**This industry includes establishments primarily engaged in the manufacturing of millwork.
- **32199a Prefabricated Home Manufacturing:** This industry includes establishments primarily engaged in the manufacturing of mobile and prefabricated homes and structures.
- **32192 Wood Pallets & Skids Production:** This industry includes establishments primarily engaged in the manufacturing of wooden containers, pallets and wood parts for containers.

TREND SUMMARY

Although the Wood Product Manufacturing industry produces a diverse range of wood products, demand mostly depends on the level of residential construction and downstream household spending patterns. Industry products include wood ladders, wood handles for hand tools, kiln-dried lumber, wood flour, fencing and household items, such as bowls, cutting boards, clothespins and rolling pins. After facing significant declines through the recession due to plummeting housing construction and decreased household spending, demand turned the corner in 2010 and has grown steadily through the recovery period. Rising household income and a moderate rebound in housing starts have driven demand. From 2008 to 2013, revenue is expected to increase at an average annual rate of 1.2% to \$6.3 billion. In 2013 alone, revenue is forecast to rise a robust 7.4%.

Because of faltering demand for wood products, especially in the residential construction market, many firms have exited the industry, merged or been acquired by competing firms. Over the five years to 2013, the number of firms is expected to decrease 1.3% each year on average to 1,652 companies. The majority of the companies in the industry are small firms that employ fewer than 20 people. However, over the past five years, companies have significantly downsized operations. As a result, industry employment is expected to contract 2.8% per year on average to 28,959 employees.

Over the five years to 2018, industry sales are projected to pick up as the housing market recovers. While not anticipated to reach prerecession levels, housing construction is expected to level off at about

1.9 million units toward the end of the period. As a result of heightened demand for wood products for construction and increased household spending, industry revenue is forecast to increase at an average annual rate of 7.0%, reaching \$8.8 billion by 2018. However, the industry will likely be challenged by increased competition from rubber, steel, aluminum and plastic substitutes and rising import penetration of low-cost wood products.

The information in this section is sourced directly and solely from IBISWorld.

INDUSTRY IN VERMONT

Industry Trends

	Shift Share Analysis						
NAICS Code	Description	2013 Jobs	2018 Jobs	Ind Mix Effect	Nat Growth Effect	Expected Change	Competitive Effect
321999	All Other Miscellaneous Wood Product Manufacturing	690	329	(359)	108	(251)	(109)

Source: EMSI

Forestry and Wood Products Cluster: Office Furniture Manufacturing Industry Definition

The Office Furniture Manufacturing industry produces a wide range of office furniture, including bookcases, cabinets, chairs, desks and filing cabinets. It also manufactures office and store fixtures, such as cafeteria countertops (except kitchen and bathroom), furniture parts and partitions. Furniture may be ordered predesigned or customized, and may be sold assembled or unassembled.

The North American Industry Classification System (NAICS) codes for this industry are:

- 337211* Wood Office Furniture Manufacturing
- 337212 Custom Architectural Woodwork and Millwork Manufacturing
- 337214 Office Furniture (except Wood) Manufacturing
- 337215 * Showcase, Partition, Shelving, and Locker Manufacturing

SIMILAR INDUSTRIES

Industries, including their NAICS codes (2007), which have similar workforce, supply chains, product and other similarities to this industry are:

- **32191 Millwork:** This industry manufactures millwork on a factory basis.
- **33711 Cabinet & Vanity Manufacturing:** This industry manufactures cabinets, countertops and vanities for kitchens and bathrooms.
- **33712 Household Furniture Manufacturing:** This industry manufactures furniture, bed frames and other furnishings for homes.

TREND SUMMARY

In the five years to 2013, the Office Furniture Manufacturing industry suffered as businesses cut back on expenses in the midst of the recession. With declining demand, companies within the industry were forced to lower prices to remain competitive, hampering industry profit. Furthermore, the surge of low-cost imports continues to adversely affect the industry. Countries such as China have lower labor and overhead costs, allowing them to offer lower prices on comparable products, which effectively eroded

^{*}Principal targets for Vermont

domestic demand for US-made products. Consequently, industry revenue is expected to decline at an average annual rate of 4.1% in the five years to 2013.

Volatile input prices have also adversely affected the industry. The price of steel, a major input for office furniture, plummeted 25.1% in 2009 and jumped 16.0% in the following year. These price fluctuations made it difficult for manufacturers to anticipate future spending and control costs. As a result of declining demand and volatile price fluctuations in steel, profit decreased from 3.3% of revenue in 2008 to 1.9% in 2013. Consequently, many firms were forced to exit the industry completely. In the five years to 2013, the number of office furniture manufacturers decreased at an average annual rate of 1.3% to total 3,809 businesses.

Despite these challenges, IBISWorld expects industry revenue to grow a modest 0.4% to \$23.2 billion in 2013, fueled by US enterprise growth and the expansion of corporate profit. The more businesses there are, the more office furniture is needed. Additionally, businesses are more likely to invest in new furniture when profit is expanding and they have more cash on hand.

As the number of US businesses increases, industry revenue is forecast to rise an annualized 1.0% to \$24.4 billion in the five years to 2018; however, some mitigating factors will remain. Higher import penetration will lower domestic demand and increase price pressures on domestic manufacturers, slightly constricting growth. Also, raw material prices are projected to continue increasing, which will adversely affect profit in the same period. Manufacturers can pass the additional costs on to buyers, but in doing so risk losing business to low-priced foreign i

The information in this section is sourced directly and solely from IBISWorld.

INDUSTRY IN VERMONT

Industry Trends

	Shift Share Analysis						
NAICS Code	Description	2013 Jobs	2018 Jobs	Ind Mix Effect	Nat Growth Effect	Expected Change	Competitive Effect
337211	Wood Office Furniture Manufacturing	108	86	(75)	17	(58)	36
337212	Custom Architectural Woodwork and Millwork Manufacturing	46	60	51	7	58	(44)
337214	Office Furniture (except Wood) Manufacturing	0	0	0	0	0	0
337215	Showcase, Partition, Shelving, and Locker Manufacturing	201	324	(138)	31	(107)	230

Source: EMSI

Manufacturing Cluster: Navigational, Measuring and Control Instruments Manufacturing

INDUSTRY DEFINITION

The industry primarily manufactures navigational, measuring and control instruments. Its products include aeronautical instruments, appliance regulators and controls (except switches), laboratory analytical instruments, navigation and guidance systems, and physical properties testing equipment.

The North American Industry Classification System (NAICS) codes for this industry are:

• 334511* Search, Detection, Navigation, Guidance, Aeronautical, and Nautical System and Instrument Manufacturing

Target Sector & Cluster Analysis – Appendix D

•	334512	Automatic Environmental Control Manufacturing for Residential, Commercial, and Appliance Use
•	334513	Instruments and Related Products Manufacturing for Measuring, Displaying, and Controlling Industrial Process Variables
•	334514	Totalizing Fluid Meter and Counting Device Manufacturing
•	334515	Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals
•	334516	Analytical Laboratory Instrument Manufacturing
•	334519	Other Measuring and Controlling Device Manufacturing

^{*} Principal target for Vermont

SIMILAR INDUSTRIES

Industries, including their NAICS codes (2007), which have similar workforce, supply chains, product and other similarities to this industry are:

- 32619 Plastic Products Miscellaneous Manufacturing: This industry manufactures plastic products.
- 32721 Glass Product Manufacturing: This industry manufactures glass products.
- **33331 Copier & Optical Machinery Manufacturing:** This industry manufactures commercial machinery like copy machines.
- **33422 Communication Equipment Manufacturing:** This industry manufactures communication equipment.
- **33429 Alarm, Horn & Traffic Control Equipment Manufacturing:** This industry manufactures alarms, horns and traffic control equipment.
- 33451 Medical Device Manufacturing: This industry manufactures medical devices.
- 33531 Electrical Equipment Manufacturing: This industry manufactures electrical equipment.
- 33593 Wiring Device Manufacturing: This industry manufactures wiring devices.
- **33911 Medical Instrument & Supply Manufacturing:** This industry manufactures medical instruments and supplies.

TREND SUMMARY

The Navigational Instrument Manufacturing industry produces various products, ranging from search, detection and navigational instruments to electricity measuring and testing equipment. The industry has a diverse customer base. Air-traffic controllers, pilots and sea captains use navigational equipment in stationary compasses and electronic guidance systems. Laboratories, spaceships, planes and buildings employ electricity measuring and testing devices. Physicians and medical researchers use the industry's diagnostic instruments. Because revenue stems from a wide customer base, the industry has experienced only moderate volatility since 2008.

Tight lending conditions and weak demand from downstream markets during the Great Recession caused revenue to contract 4.8% in 2009. In 2010, this trend reversed, with revenue increasing 6.4%. In 2013, growth is expected to continue, with revenue rising 2.4% due to further improvements in downstream manufacturing activity and corporate profit, the latter of which correlates with investment

in the research and development (R&D) of industry products. IBISWorld expects revenue to increase at an average annual rate of 1.1% to \$56.4 billion over the five years through 2013.

Industry growth depends on conditions within downstream markets, technology advancements and trade. Companies rely heavily on patents, trademarks, copyrights and trade secrets, as well as confidentiality agreements to establish and protect proprietary technology and new product innovations. Industry firms invest a great deal in R&D to develop products, and the scale of this activity depends on a company's cash flow and overall size. Additionally, as the value of the U.S. dollar increases, imports become cheaper. The dollar's appreciation over the past five years has helped raise import volumes and heighten competition against this industry's products.

In the five years to 2018, industry revenue is forecast to increase at an annualized rate of 2.7% to \$64.6 billion. An increase in R&D funding as a result of expanding budgets will drive product advancement during this period, which will elevate the already strong increase in demand from growing downstream industries. However, industry exports will continue to decline due to an appreciating dollar and lower cost products made abroad, which will weaken revenue growth. These conditions will also help competing imports gain market share, as they will grow from 12.2% to 16.9% of domestic demand.

The information in this section is sourced directly and solely from IBISWorld.

INDUSTRY IN VERMONT

Industry Trends

	Shift Share Analysis								
NAICS Code	Description	2013 Jobs	2018 Jobs	Ind Mix Effect	Nat Growth Effect	Expected Change	Competitive Effect		
334511	Search, Detection, Navigation, Guidance, Aeronautical, and Nautical System and Instrument Manufacturing	16	157	(5)	3	(2)	143		
334512	Automatic Environmental Control Manufacturing for Residential, Commercial, and Appliance Use	66	0	(56)	10	(46)	(21)		
334513	Instruments and Related Products Manufacturing for Measuring, Displaying, and Controlling Industrial Process Variables	29	94	(5)	5	0	66		
334514	Totalizing Fluid Meter and Counting Device Manufacturing	<10	<10	(6)	1	(5)	(4)		
334515	Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals	0	<10	(1)	0	(1)	2		
334516	Analytical Laboratory Instrument Manufacturing	25	163	(2)	4	2	137		
334519	Other Measuring and Controlling Device Manufacturing	793	983	(82)	124	42	148		

Source: EMSI

Manufacturing Cluster: Aerospace Industry Subsector Industry Definition

As defined for the Vermont CEDS, companies in this industry manufacture and overhaul complete aircraft, develop prototypes and convert aircraft. The industry also includes the manufacture,

conversion and overhaul of aircraft engines and propulsion systems. Additionally, the industry makes related parts and auxiliary equipment. The major products and services of this industry are aircraft, aircraft engines and engine parts, and other aircraft parts and auxiliary equipment.

The North American Industry Classification System (NAICS) codes for this industry are:

- 336411 Aircraft Manufacturing
- 336412 Aircraft Engine and Engine Parts Manufacturing
- 336413 Other Aircraft Parts and Auxiliary Equipment Manufacturing

SIMILAR INDUSTRIES

Industries, including their NAICS codes (2007), which have similar workforce, supply chains, products and other similarities to the aerospace industry are:

- **33631 Automobile Engine & Parts Manufacturing:** This industry manufactures aircraft engine intake and exhaust valves, pistons and engine filters.
- **33632 Automobile Electronics Manufacturing:** This industry manufactures electrical equipment for aircraft engines and aircraft lighting fixtures.
- 33641- Space Vehicle & Missile Manufacturing: This industry manufactures guided missiles and space vehicles.
- 48819 Aircraft Maintenance, Repair & Overhaul: This industry provides repair services for aircraft and aircraft engines, including overhauling, conversion and rebuilding.
- **54171 Scientific Research & Development:** Some research and development businesses with a focus on the aerospace sector (except prototype production).

TREND SUMMARY

The Aerospace Industry as defined for the Vermont CEDS had a mixed economic performance over the past couple of years. Overall industry revenue declined during the recent recession (December 2007-June 2009) because of fewer purchases of commercial aircraft and parts from airliners due to lower air travel demand.

According to IBISWorld, the largest industry research firm, demand from domestic and international airlines dropped by 16.3% and 20.6% respectively in 2009 over the previous year. However, in 2010 demand for air travel started to recover, allowing airlines to expand their purchase of aircraft and parts. Foreign demand was particularly strong as growing emerging markets underwent a boom in air travel. Since more than half of the industry's revenue is generated through exports, global demand allowed industry revenue to recover from its recessionary low.

As a result, demand from domestic and international airlines has grown steadily since 2009, nearly recovering to its prerecession highs. In particular, demand for the newest, more fuel-efficient planes and engines rose, as airlines sought to mitigate volatile fuel prices and gain an operational advantage.

Demand for military related products remained strong during the recession largely as a result of combat operations in the Middle East, which tempered the overall industry's revenue decline during that period. However, by 2011 falling federal funding pushed revenue in the defense segment down. The end of combat operation in Iraq and budget cuts reduced the amount of money the government allocated towards purchases of military aircraft and related parts.

In conjunction with these trends over the past five years, the industry's commercial and defense segments consolidated. Recession-induced declines in demand created price competition among manufacturers, resulting in reduced industry profit. Because the industry's original equipment manufacturer (OEM) segment was already highly concentrated, a large portion of this price pressure was put on small- to medium-sized parts suppliers. Their relatively small size meant that they had to accept lower prices from their OEM clients. Consequently, the supplier market came under pressure to consolidate, as bigger suppliers have more negotiating power and can sell parts at cheaper rates due to economies of scale.

In addition, consolidation was further encouraged because the notoriously complex aerospace supply chain benefited anyone who can provide simplification. Because of the recession and declining defense funding, both segments of the industry have consolidated to cut costs. As a result, the number of industry enterprises and employment declined at an annualized 0.7% and 1.6%, respectively, to 1,274 business and 317,304 workers.

As result of these events, IBISWorld expects industry revenue to rise only at an annualized rate of 0.6% to \$173.7 billion between 2008 and 2013, with a 2.8% jump in 2013 due to strong global and domestic demand for commercial aircraft.

In the five years to 2018, industry revenue is forecast to rise at an annualized rate of 3.8% to \$209.5 billion. Strong global and domestic demand for commercial aircraft will drive growth, while continued cuts in federal spending for defense will offset some of these gains. Consolidation will also continue, especially in the supply chain, as increased demand encourages a larger formation of suppliers that have the necessary capacity to handle demand.

The information in this section is sourced directly and solely from IBISWorld.

INDUSTRY IN VERMONT

Industry Trends

	Shift Share Analysis									
NAICS	Description	2013	2018	Ind Mix	Nat Growth	Expected	Competitive			
Code	Description	Jobs	Jobs	Effect	Effect	Change	Effect			
336411	Aircraft Manufacturing	0	0	0	0	0	0			
336412	Aircraft Engine and Engine Parts Manufacturing	1535	936	(560)	240	(320)	(279)			
336413	Other Aircraft Parts and Auxiliary Equipment Manufacturing	205	327	19	32	51	72			

Source: EMSI

Manufacturing Cluster: Medical Device Manufacturing Industry Definition

This industry includes manufacturers of electromedical and electrotherapeutic apparatus, such as magnetic resonance imaging equipment, medical ultrasound equipment, pacemakers, hearing aids, electrocardiographs and electromedical endoscopic equipment. The industry also manufactures irradiation apparatus and tubes for applications such as medical diagnostic, medical therapeutic, industrial, research and scientific evaluation.

The North American Industry Classification System (NAICS) codes for this industry are:

- 334510 Electro-medical and Electrotherapeutic Apparatus Manufacturing
- 334517 Irradiation Apparatus Manufacturing

SIMILAR INDUSTRIES

Industries, including their NAICS codes (2007), which have similar workforce, supply chains, product and other similarities to this industry are:

- **33331 Copier & Optical Machinery Manufacturing:** Firms manufacturing optical instruments, which may be used in some medical applications, are classified in this industry.
- **33531 Electrical Equipment Manufacturing:** Firms manufacturing motor control switches and relays, including timing relays, are classified in this industry.
- **33911 Medical Instrument & Supply Manufacturing:** Firms manufacturing nonelectrical medical and therapeutic apparatus are included in this industry.
- **33911 Glasses & Contact Lens Manufacturing:** Some Medical Device Manufacturing industry firms, such as Johnson & Johnson, also manufacture vision products, such as contact lenses.

TREND SUMMARY

The recession took a toll on a number of Medical Device Manufacturing firms. Industry revenue plunged 25.6% in 2009, as hospitals struggled to raise capital for large assets and accordingly delayed the purchase of medical equipment. However, the improving economy and technological advances have stimulated demand for medical devices in the years since the recession. The aging U.S. population has further contributed to revenue growth, due to the high incidence of health issues requiring medical devices in the elderly population. Although IBISWorld estimates industry revenue to have decreased at an annualized 3.6% in the five years since 2008, industry revenue is expected to grow 5.5% in 2013, to \$35.2 billion.

Between 2013 and 2018, industry growth will likely continue, with revenue increasing 7.0% per year on average to \$49.5 billion. The aging baby boomer population and further technological developments will continue to bolster industry growth, but the changing regulatory environment will hamper profitability. The Patient Protection and Affordable Care Act's 2.3% excise tax on the sale of medical devices will continue to drag down average industry profit margins, from 9.0% of revenue in 2013 to about 8.5% in 2018. Planned reform of the approval process for new devices will likely further hinder innovation and encourage more companies to shift some operations overseas.

The total value of industry exports is estimated to rise an annualized 3.3% in the five years to 2013, and this trend is expected to continue into the next five years. Continued globalization will also affect the composition of the industry in the next five years, as firms will increasingly outsource manufacturing, research and development and other operations, which in turn will likely reduce the total number of industry operators. At the same time, profit-squeezed industry operators looking to gain market share will seek to procure new technologies by acquiring small innovative companies instead of investing in their own in-house research and development. IBISWorld expects these outsourcing and acquisition trends to have an overall consolidating effect on the industry, with the total number of firms declining at an annualized rate of 5.6% in the five years to 2018.

The information in this section is sourced directly and solely from IBISWorld.

INDUSTRY IN VERMONT

Industry Trends

	Shift Share Analysis								
NAICS	Description	2013	2018	Ind Mix	Nat Growth	Expected	Competitive		
Code	Description	Jobs	Jobs	Effect	Effect	Change	Effect		
334510	Electromedical and Electrotherapeutic Apparatus Manufacturing	230	<10	24	36	60	(280)		
334517	Irradiation Apparatus Manufacturing	<10	816	1	1	2	809		

Source: EMSI

Manufacturing Cluster: Semiconductor and Circuit Manufacturing Subsector Industry Definition

As defined for the Vermont CEDS, this industry includes companies that manufacture semiconductors and related devices and parts. Products in this industry include integrated circuits, memory chips, microprocessors, diodes, transistors and other optoelectronic devices.

The North American Industry Classification System (NAICS) code for this industry is:

• 334413 Semiconductor and Related Device Manufacturing

SIMILAR INDUSTRIES

Industries, including their NAICS codes (2007), which have similar workforce, supply chains, products and other similarities to the semiconductor and circuit manufacturing industry are:

- 33329 Semiconductor Machinery Manufacturing: This industry manufactures equipment used to make semiconductors, including wafer-processing equipment, semiconductor assembly and packaging equipment.
- **33411 Computer Manufacturing:** This industry manufactures designs or assembles personal computers (PCs), laptops, handheld computers and servers.
- 33411 Computer Peripheral Manufacturing: This industry includes companies that
 manufacture computer displays (i.e. monitors) and peripherals (e.g. keyboards, mice, printers
 and scanners).
- **51121 Software Publishing:** This industry is involved in designing, developing and publishing prepackaged software.

TREND SUMMARY

Semiconductors are a basic component of electronic devices and form a vital part of products ranging from electronic devices and systems (e.g. computers, cell phones and televisions) to solutions and services (e.g. internet providers, telecommunications and broadcasting services). The industry is one of the top exporters in the country and, according to the Semiconductor Industry Association (SIA), directly employs 250,000 in the U.S.

Industry revenue is expected to increase at an annualized rate of 1.5% between 2008 and 2013. However, In 2013, U.S. semiconductor manufacturers are expected to see a 2.7% decrease in revenue over 2012, due to a reduced demand for U.S.-made semiconductors created by more efficient and lower-cost alternatives produced abroad. Production outsourcing and price reductions have been hampered revenue growth. Emerging countries have drawn semiconductor manufacturers away from the U.S. through industrial policy, tax incentives and cheaper labor. Declines were also exacerbated by the recession and the resulting weak demand for computers and consumer electronics. Downstream demand from domestic computer manufacturing, for example, fell at an annualized rate of 7.8% in the five years to 2013, reducing revenue for domestic semiconductor and circuit manufacturers.

During the five years to 2018, demand from the Computer Manufacturing industry is expected to decline at an annualized rate of 3.9%. Since this industry is a key buyer for the Semiconductor and Circuit Manufacturing industry, sales of microprocessors and central processing units to domestic PC manufacturers are expected to decline. In addition, the price of semiconductor and electronic components is expected to weaken, a result of fierce competition and a struggling global economy. This depression in price will likely cause a reduction in the number of industry operators as they work to

maintain profit margins. IBISWorld expects profit margins to stay relatively flat through 2018, although increased production volume will produce higher profit overall.

One potential growth market for semiconductors is consumer electronics, such as smartphones, digital cameras and automotive electronics. Sales of semiconductors used in certain consumer electronics are projected to grow over the five years to 2018. Semiconductor vendors with competitive product offerings in the consumer electronics sector will benefit from growth in this market. In addition, semiconductor sales to industrial markets are expected to revive in 2014, as growth in industrial production volume strengthens. The use of electronics in the automotive industry (with regard to safety, comfort and entertainment) is also increasing, due in part to the use of mechanical devices. An overall trend toward automation will sustain some of the industry's growth over the five-year period.

Original equipment manufacturers (OEMs) of electronic systems are increasingly outsourcing the integration of the semiconductor and software components of their products to suppliers. OEMs are also increasingly adopting complete system-level solutions that integrate the functionality of multiple integrated circuits required to operate on a "system-on-a-chip." These trends benefit semiconductor companies that possess strong system-level expertise, software capabilities, validation and testing capabilities, fully functional reference designs and detailed knowledge of specific end-markets to successfully provide system solutions.

Some domestic semiconductor companies have a technological lead in certain markets. For example, Intel is the world's leading microprocessor designer and manufacturer, serving as the primary microprocessor provider for major computer manufacturers such as Apple and Hewlett-Packard. However, American companies will need to maintain significant research and development spending in order to compete with overseas companies, which are increasingly contributing to technological innovation.

Overseas competition will exert tremendous pressure on domestic semiconductor manufacturers, resulting in overall contraction in the next five years. Consequently, wages are forecast to decline at an annualized rate of 0.8% to \$8.2 billion in 2018, as companies downsize and increase automation of semiconductor manufacturing. In the same time period, the number of industry operators is estimated to decline at an annualized 0.9% to 799. As companies leave the industry, employment is projected to decline at a 1.1% annualized rate to 87,705 employees during the next five years.

The information in this section is sourced directly and solely from IBISWorld.

INDUSTRY IN VERMONT

Industry Trends

Shift Share Analysis									
NAICS Code	Description	2013 Jobs	2018 Jobs	Ind Mix Effect	Nat Growth Effect	Expected Change	Competitive Effect		
334413	Semiconductor and Related Device Manufacturing	9102	3391	(4167)	1422	(2745)	(2966)		

Source: EMSI

Information Technology Cluster: IT Consulting

INDUSTRY DEFINITION

The IT Consulting industry includes firms that provide the following services to client companies: writing, testing and supporting custom software; planning and designing integrated hardware, software and communication infrastructure; and on-site management of computer systems and data processing

facilities. This industry excludes packaged software publishers and off-site data processing and hosting services.

The North American Industry Classification System (NAICS) codes for this industry are:

- 541511 Custom Computer Programming Services
- 541512 Computer Systems Design Services
- 541513 Computer Facilities Management Services
- 541519 Other Computer Related Services

SIMILAR INDUSTRIES

Industries, including their NAICS codes (2007), which have similar workforce, services and other similarities to this industry are:

- **42343 Computer & Packaged Software Wholesaling:** This industry wholesales IT goods that consultants use or operate on.
- **44312 Computer Stores:** Retailers sell computer hardware or software products and provide support services, such as customized assemblies.
- 51121 Software Publishing: Software publishers produce and distribute computer software, including designing, providing documentation, assisting in installation and providing support services to software purchasers.
- **51821 Data Processing & Hosting Services:** Data processing is often a small part of the broader consulting process, and there is a great deal of outsourcing to this industry.

TREND SUMMARY

Due to the low capital requirements of the industry, the majority of operators are small, nonemploying firms and independent contractors. In the five years to 2013, demand for all-inclusive consulting services has inspired a rash of merger and acquisition (M&A) activity among larger players, with smaller, specialized companies still entering the industry. As a result, the number of industry enterprises is growing at a slower rate than the number of establishments.

Between 2008 and 2013, the industr performed well in a challenging economic climate. Strong performance from major markets, such as financial services and insurance providers, allowed the IT Consulting industry to expand until 2009, when revenue fell by 3.8% as the effects of the recession caught up with the industry. Falling corporate profit and demand from major markets resulted in many firms tightening budgets to improve profit margins, including slashing expenditure on IT systems and consulting. Greater demand from the public sector assisted the industry during this period; however, it was not enough to prevent losses. Rising corporate profit in 2010 triggered new demand for IT consulting, as many firms looked to improve efficiencies through better computer systems. Growth in integrated systems sales, combined with all-inclusive consulting services, boosted industry profit from 6.6% of revenue in 2008 to 7.5% in 2013. These factors contributed to an annualized 2.2% growth rate in industry revenue in the five years through 2013. The IT Consulting industry is expected to grow further by 1.2% to reach \$337.0 billion in 2013.

As the economy recovers, improving business sentiment and corporate profit levels will further drive industry performance. In the five years to 2018, industry revenue is expected to grow an annualized 2.9% to \$389.4 billion. Increasing M&A activity in other industries will spur demand for IT consultants, and with more consolidations, companies will require assistance in the integration of accounting, information storage and other systems. Additionally, profit is projected to grow only slightly during this

time as major companies continue to shift the balance of their services toward higher value-added offerings; however, this will be somewhat mitigated by increasing price competition.

The information in this section is sourced directly and solely from IBISWorld.

INDUSTRY IN VERMONT

Industry Trends

Shift Share Analysis									
NAICS Code	Description	2013 Jobs	2018 Jobs	Ind Mix Effect	Nat Growth Effect	Expected Change	Competitive Effect		
541511	Custom Computer Programming Services	1388	2805	756	217	973	444		
541512	Computer Systems Design Services	690	2006	664	108	772	544		
541513	Computer Facilities Management Services	204	<10	(52)	32	(20)	(176)		
541519	Other Computer Related Services	232	79	(99)	36	(63)	(91)		

Source: EMSI

Professional and Technical Services Cluster: Engineering Services INDUSTRY DEFINITION

Industry establishments apply the physical laws and principles of engineering in designing, developing and using machines, materials, instruments, structures, processes and systems. These services may involve providing advice, preparing feasibility studies, preparing plans and designs, providing technical services during the construction or installation phase, inspecting and evaluating engineering projects and providing other related services.

The North American Industry Classification System (NAICS) code for this industry is:

• 541330 Engineering Service

SIMILAR INDUSTRIES

Industries, including their NAICS codes (2007), which have similar workforce, services and other similarities to this industry are:

- **23 Construction:** This industry primarily designs and constructs buildings, highway, and other structures, or manages construction projects.
- **54131 Architects:** These businesses provide architectural services involving designing buildings and structures.
- **54132 Landscape Design:** This industry provides landscape architectural services involving designing streetscapes, gardens and public access areas.
- **54136 Geophysical Services:** This industry gathers, interprets, and maps geophysical data.
- **54137 Surveying & Mapping Services:** This industry performs surveying and mapping of the earth's surface, including the sea floor.
- **54142 Industrial Designers:** This industry creates and develops designs and specifications that optimize the use, value and appearance of products.
- **54151 IT Consulting:** This industry plans and designs computer systems that integrate computer hardware, software and communication technologies.

 54162 - Environmental Consulting: This industry provides advice and assistance to others on environmental issues, such as controlling environmental contamination from pollutants, toxic substances and hazardous materials.

TREND SUMMARY

Subdued construction levels and constrained private demand severely limited the Engineering Services industry over the past five years. Industry revenue started to decline as downstream construction markets came to a halt during the recession. While long-term contracts allowed many engineering firms to maintain revenue growth as the recession began, many companies postponed or cancelled upcoming projects. The shortage of liquidity in global financial markets also cut into demand for engineering services. These declines have caused revenue to fall at an average annual rate of about 2.1% to total \$199.5 billion over the five years to 2013. However, the construction market has begun to show signs of improvement; as a result, industry revenue is expected to increase 2.7% in 2013.

The Engineering Services industry is fragmented, with a large number of small-scale operators that often provide services to regional markets or specialized niches. About two-thirds of firms are nonemployers, which were hit particularly hard by the reduction in demand following the recession. As a result, many of these small firms were forced to leave the industry in 2009 and 2010. Firms have begun to reenter as business conditions have improved over the past two years. Consequently, the number of enterprises is expected to grow at an annualized rate 0.8% to 141,639 in the five years to 2013.

Between 2013 and 2018, the industry is anticipated to grow as the economy recovers, the value of construction rises and demand from key downstream markets revives. Revenue is forecast to increase at an average rate of 2.9% per year to total \$230.6 billion by 2018. Profitability is forecast to improve slightly, especially among large operators that provide high-margin services, such as construction management. Profit margins should also benefit from the rising use of computer-aided design systems that provide cost-effective project assessment. This technology will increasingly be used at construction sites via tablet devices, improving communication and reducing costs associated with on-site errors.

The information in this section is sourced directly and solely from IBISWorld.

INDUSTRY IN VERMONT

Industry Trends

Shift Share Analysis								
NAICS	Description	2013	2018	Ind Mix	Nat Growth	Expected	Competitive	
Code	Description	Jobs	Jobs	Effect	Effect	Change	Effect	
541330	Engineering Services	1636	2139	420	256	676	(173)	

Source: EMSI

Professional and Technical Services Cluster: Management Consulting Industry Definition

Management consultants advise businesses, nonprofits and public-sector agencies in the following areas: organizational design, human resources, corporate strategy, information technology strategy, marketing and sales, finances and logistics. This industry excludes establishments providing day-to-day administrative services and establishments that are concentrated in recruitment, training, public relations, market research, engineering design, computer systems design and investment advice.

The North American Industry Classification System (NAICS) codes for this industry are:

• 541611 Administrative Management and General Management Consulting Services

Target Sector & Cluster Analysis – Appendix D

- 541612 Human Resources Consulting Services
- 541613 Marketing Consulting Services
- 541614 Process, Physical Distribution, and Logistics Consulting Services
- 541618 Other Management Consulting Services

SIMILAR INDUSTRIES

Industries, including their NAICS codes (2007), which have similar workforce, services and other similarities to this industry are:

- **54121 Accounting Services:** Accounting firms provide financial and associated management services.
- **54121 Tax Preparation Services:** Tax preparation firms provide financial and associated management services.
- **54133 Engineering Services:** Consulting engineers help oversee the planning and designing of construction and industrial operations.
- **54151 IT Consulting:** IT consultants help plan and design computer systems. This industry is being increasingly linked with management consulting.
- **54182 Public Relations Firms:** Public relations firms are brought in to ensure that a client's image and perception among customers and competitors is positive.
- **54191 Market Research:** Market research is conducted when firms wish to know more about the market in which they operate.
- **61143 Business Coaching:** This is an education-based industry adjunct to management consulting, whereby employees develop skills necessary for effective and efficient implementation.

TREND SUMMARY

After tepid growth over the past few years, the Management Consulting industry is poised to make a recovery in 2013 with expected revenue growth of 5.4% during the year. The industry includes firms that provide assistance to private, public and nonprofit institutions on issues ranging from strategic organization to human resources planning. With more than 90.0% of industry revenue coming from consulting contracts with private businesses, industry performance is largely driven by the level of corporate profit and the number of businesses in the United States.

Industry revenue has been sluggish, with estimated annualized growth of only 0.2% in the five years to 2013, totaling \$171.9 billion. Prior to 2008, management consulting was countercyclical, exhibiting revenue increases throughout economic downturn, due to restructuring demand. However, the Great Recession reversed this trend, causing most industries to reduce their consulting budgets. Simultaneously, competition in this low-demand environment caused industry-wide fee declines, compressing profit margins. Operating with excess capacity, management consultancies with full-time employees cut down hiring; however, the number of independent contractors increased overall, raising employment from 1.2 million workers in 2008 to 1.3 million in 2013, which represents an estimated annualized increase of 1.4% over the past five years.

As corporate profit recovered, so have industry prospects. In 2013, industry revenue is expected to rise, driven by increased corporate spending. Corporations that survived the economic downturn but delayed consulting expenditures will reinvest profit in business strategy updates, human resources and

information technology infrastructure. As a result, industry revenue is expected to grow at an annualized rate of 3.5% over the next five years, increasing to \$203.7 billion in 2018. Over the same period, employment is expected to increase at an annualized rate of 3.1%, as consultancies hire to meet rising demand.

Hit by industry-wide price compression, profit margins dropped from 11.7% of revenue in 2008 to about 9.1% in 2013. IBISWorld forecasts that profit margins will increase gradually to 10.9% of revenue by 2018. As increasing profitability heightens competition, the industry landscape will shift over the next five years, reflecting opposing trends toward consolidation among major companies and fragmentation among highly specialized firms.

The information in this section is sourced directly and solely from IBISWorld.

INDUSTRY IN VERMONT

Industry Trends

Shift Share Analysis									
NAICS	Description	2013	2018	Ind Mix	Nat Growth	Expected	Competitive		
Code	Description	Jobs	Jobs	Effect	Effect	Change	Effect		
541611	Administrative Management and General Management Consulting Services	534	1824	560	83	643	647		
541612	Human Resources Consulting Services	147	206	(24)	23	(1)	60		
541613	Marketing Consulting Services	487	621	844	76	920	(786)		
541614	Process, Physical Distribution, and Logistics Consulting Services	100	87	103	16	119	(132)		
541618	Other Management Consulting Services	297	193	(12)	46	34	(139)		

Source: EMSI